

# Rhodora

JOURNAL OF THE  
NEW ENGLAND BOTANICAL CLUB

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MERRITT LYNDON FERNALD, Editor-in-Chief

CHARLES ALFRED WEATHERBY

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} Associate Editors

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CONTENTS:

Revision of the Genus <i>Pteridium</i> (concluded). <i>R. M. Tryon, Jr.</i>	37
An old Forest in Stonington, Connecticut. <i>Hugh M. Raup.</i>	67
Remarks on the Name <i>Phlox nivalis</i> . <i>Edgar T. Wherry.</i>	71
Reappearance of rare New England Marine Algae. <i>Wm. Randolph Taylor.</i>	72
<i>Nymphaea tetragona</i> in Somerset County, Maine. <i>J. S. Gashwiler.</i>	74
Deam's Flora of Indiana (Review). <i>C. A. Weatherby.</i>	75
New Form of <i>Bromus inermis</i> . <i>John W. Moore</i>	76

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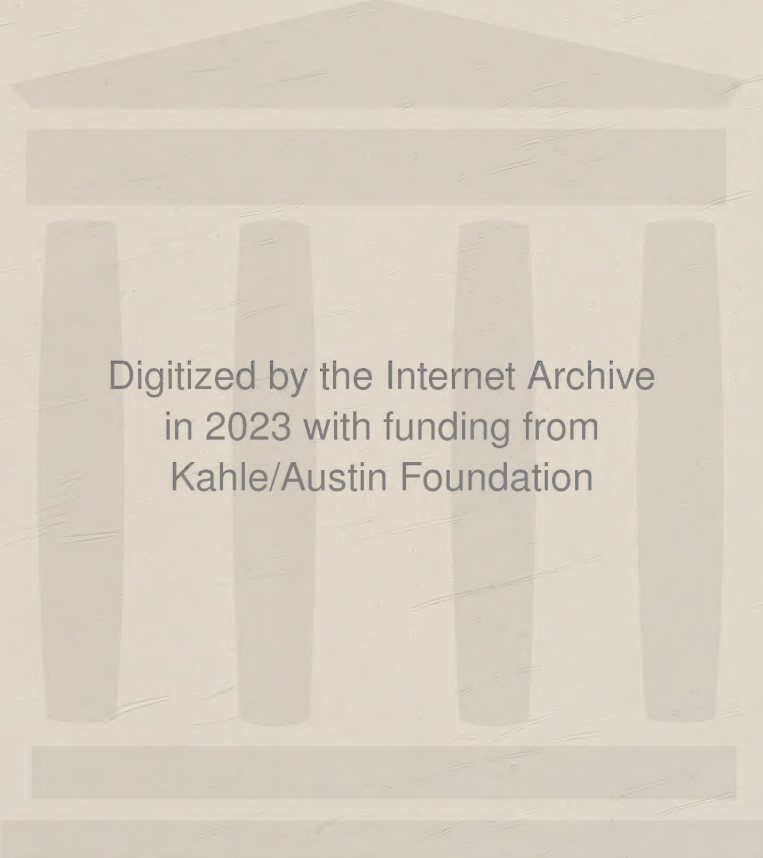
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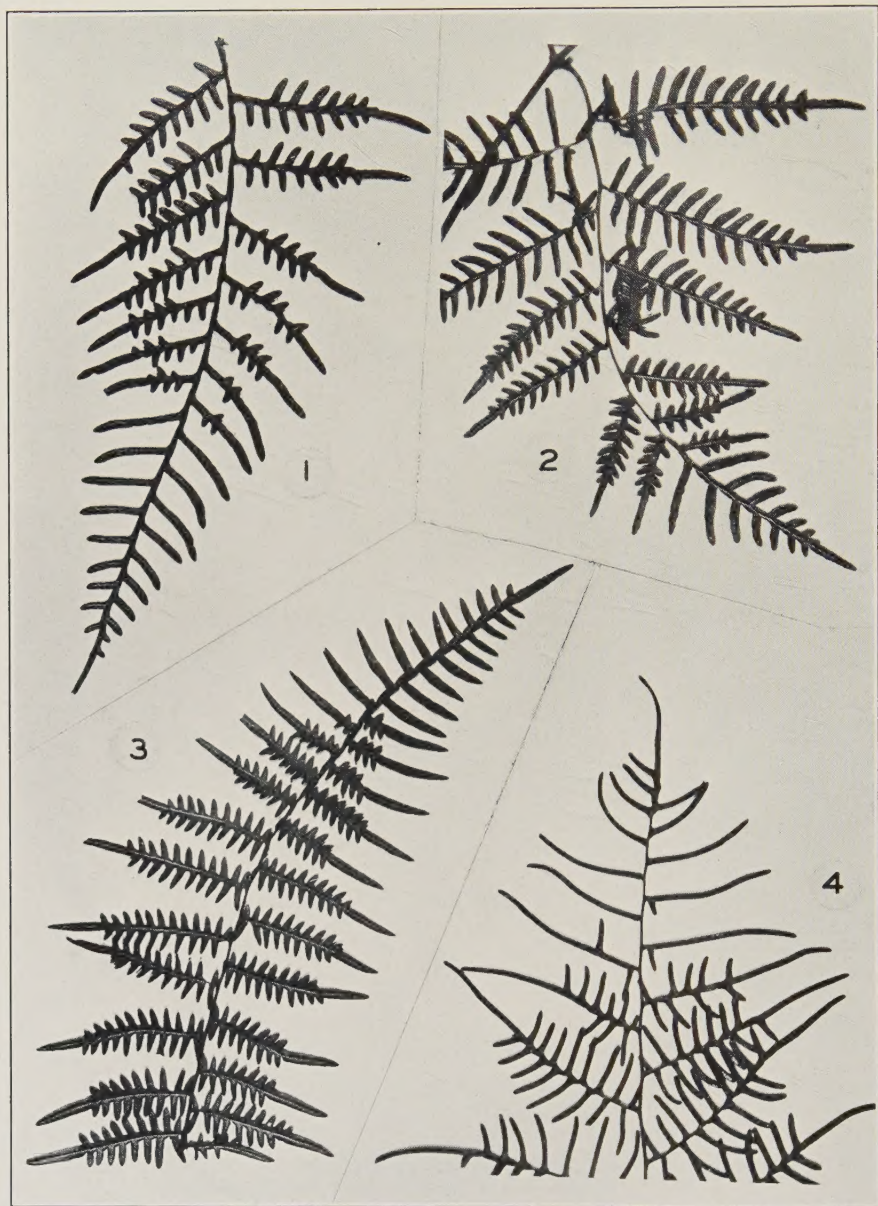


FIG. 1, upper half of middle pinna of *PTERIDIUM AQUILINUM*, var. *ESCULENTUM*,  $\times \frac{1}{2}$ ; FIG. 2, basal pinna of small plant of var. *YARRABENSE*,  $\times \frac{1}{2}$ ; FIG. 3, upper pinna of var. *ARACHNOIDEUM*,  $\times \frac{1}{3}$ ; FIG. 4, tip of frond of var. *CAUDATUM*,  $\times \frac{1}{2}$ .

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## A REVISION OF THE GENUS *PTERIDIUM*

R. M. TRYON, JR.

(Continued from page 31)

4. *PTERIDIUM AQUILINUM* var. *FEEI* (Schaffn. ex Fée) Maxon ex Yuncker, Field Mus. Pub. Bot. **17**: no. 4, 308 (1938). PLATE 650, FIG. 4, PLATE 651, FIG. 1, MAP 7.

*Pteris aquilina* L. var. *pubescens* Kze. Linnaea **13**: 142 (1839), as to plant, not as to basynym, *Pteris lanuginosa* Spreng. *Pteris aquilina* L. var. *pubescens* Spreng. ex Liebm. Vid. Selsk. Skr. s. 5, **1**: 225 (1849), as to plant, not as to basynym, *Pteris lanuginosa* Bory ex Willd. *Pteris Feei* Schaffn. ex Fée, Mém. Fam. Foug. **8**: 73 (1857). *Pteridium Feei* (Schaffn. ex Fée) [combination incorrectly attributed to Maxon by] Faull, Contrib. Arn. Arb. **11**: 87 (1938).

*Pteris aquilina* L. var. *pubescens* Spreng. ex Liebm. based on *Pteris lanuginosa* Bory ex Willd. and *Pteris aquilina* L. var. *pubescens* Kze. based on *Pteris lanuginosa* Spreng. are both earlier varietal names than var. *Feei*, and were originally applied to this variety, but their basynyms refer them, respectively, to var. *typicum* and var. *latiusculum*. Also, of course, they could not be used under *Pteridium* because of var. *pubescens* Underw.

Growing tip of the rhizome with a tuft of dark hairs; frond 0.2–1 m., usually about 0.5–0.7 m. high, veneration subgleichen-ioid; stipe usually shorter than the blade; blade 1–5 dm., usually about 3 dm. long, usually broadly ovate or pentagonal, less often ovate or broadly triangular, not ternate, usually bipinnate-pinnatifid to tripinnate, less often tripinnate-pinnatifid; rachis usually slightly pubescent, sometimes strongly pubescent or



glabrate; pinnae and pinnules short-acuminate to obtuse; pinnules usually nearly at right angles to the costa, sometimes at an oblique angle; costules slightly to moderately pubescent beneath and less so above; penultimate segments pinnatifid, often pinnate, or pinnate-pinnatifid; longest entire segment or entire part of a segment from three to eight, usually about four, times as long as broad; *ultimate segments* usually straight, rarely subfalcate, adnate or broadest at the base, the *upper surface* slightly to moderately *pubescent*, at least near the margin, the midnerve glabrous or slightly pubescent, the *margin* usually moderately *pubescent*, rarely glabrate, the lower surface usually densely pubescent, rarely slightly pubescent or pubescent only on the midnerve; *fertile and sterile indusium ciliate* and sometimes also *pubescent* on the outer surface, the *fertile* usually 0.3 mm. or more wide, the *sterile* usually 0.4 mm. or more wide, the *fertile portion no broader than the sterile* on the same segment.

TYPE: *Schaffner* 138, 141. Probably at Rio de Janeiro (not seen).

TYPE LOCALITY: Huatusco, Mexico.

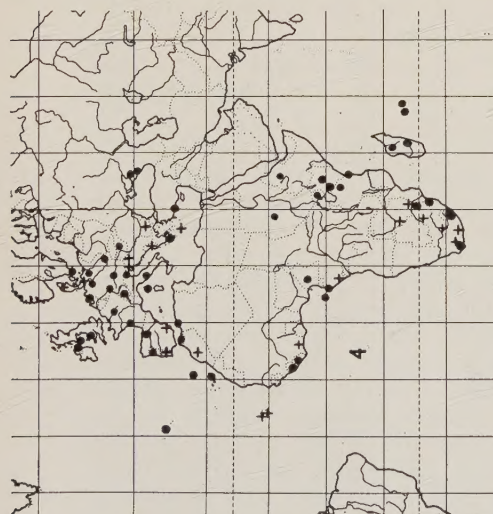
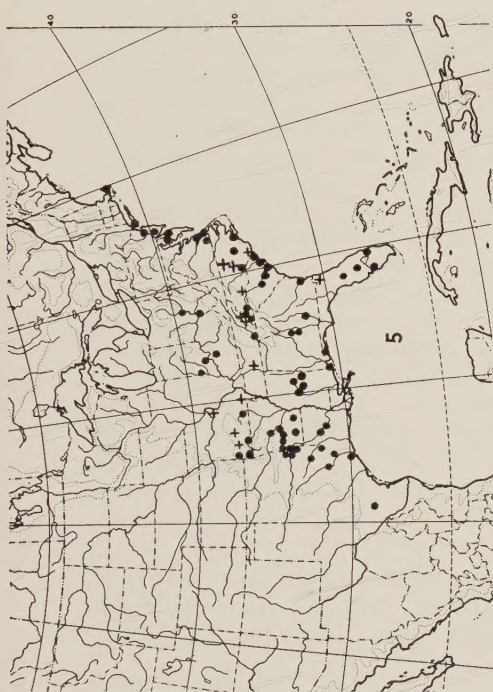
Some specimens of var. *Feei* are not entirely typical, having some character of var. *pubescens*: *Heyde & Lux* from Guatemala and *Mohr* from Vera Cruz, Mexico have the sterile indusium narrow, 0.2–0.3 mm. wide; *Rose* 2212, Tepic, Mexico has the sterile indusium only slightly ciliate; and *Palmer* 67, San Luis Potosí, Mexico has an ovate blade. *Ortega* 7400, Sinaloa, Mexico, 1934 (F) is intermediate between the two varieties.

Var. *Feei* may be separated from var. *pubescens* by its conspicuously ciliate rather than only slightly, if at all, ciliate fertile indusium, the usually much more ciliate sterile indusium, which is also almost twice as broad, and the fertile portion of the indusium no broader than the sterile on the same segment rather than broader. On the average, the fronds are considerably smaller.

It differs from var. *typicum* in having the margin of the segments pubescent rather than glabrous, the sterile indusium usually considerably broader, and in its usually smaller size. Its differences from var. *decompositum*, with which it is also closely related, are discussed under that variety.

Var. *Feei* grows in the mountains of Mexico, Guatemala and Honduras, up to 2800 m.

MEXICO.—SAN LUIS POTOSI: San Miguelito Mts., 1876, *Schaffner* 925 (G); Alvarez, Sept. 5–10, 1902, *E. Palmer* 67 (F, G, NY,



Ranges of *PTERIDIUM AQUILINUM* var. *TYPICUM*

(map 4); var. *PSEUDOCAUDATUM* (map 5); var. *AFRICANUM* (map 6);  
var. *Feei* (map 7).



US). TERR. TEPIC: near Santa Teresa, Aug. 12, 1897, *Rose* 2212 (G, NY, US). GUANAJUATO: 1905, *Duges* 6 (US). HIDALGO: Durango, Aug. 13, 1937, *Fisher* (NY, US); El Chico, July, 1927, *Lyonnet* 98 (G, NY); between Somoriel and Las Lajas, Aug. 5, 1905, *Rose, Painter & Rose* 9204 (NY, US). VERA CRUZ: Huatusco, April, 1857, *Mohr* (U. S. Nat. Herb. no. 724103); Cordoba, 1889-91, *Fink* 18 (G, NY, US); near Jalapa, May 12, 1900, *Pringle* 8342 (US). MEXICO: Oct., 1875, *Schaffner* 59 and 116 (NY); below Ajusco, Sept. 19, 1903, *Rose & Painter* 7214 (G, US). PUEBLA: Teziutlan, Sept. 7, 1910, *Orcutt* 4029 (US). OAXACA: Cerro de San Felipe, Sept. 26, 1897, *Conzatti & Gonzales* 487 (G); Cuicatlan, June 16 and 22, 1898, *Conzatti & Gonzales* 747 (G, US).—GUATEMALA: Between Solola and Chiducadenango, Aug. 13, 1936, *Hatch & Wilson* 322 (US); Chichavac, Chimaltenango, Nov.-Dec., 1930, *Skutch* 12 (US); Laguna de Avarza, Jalapa, Sept., 1892, *Heyde & Lux* (J. D. Smith no. 4080) (G, NY, US). HONDURAS: Near Siguatepeque, Dept. Comayagua, July 3, 1936, *Yuncker, Dawson & Youse* 5600 (F, G, NY, US).

5. *PTERIDIUM AQUILINUM* var. **decompositum** (Gaud.), n. comb. PLATE 650, FIG. 5, PLATE 651, FIG. 2. Illustration: St. John & Hosaka, Weeds Pineapple Fields. Haw. Is., Univ. Haw. Res. Pub. 6, 24 (1932).

*Pteris decomposita* Gaud. in Freye. Voy. Bot. 393 (1829). *Pteridium capense* (Thunb.) Krasser var. *decompositum* (Gaud.) Nakai, Bot. Mag. Tokyo 39: 110 (1925).

Growing tip of the rhizome with a tuft of dark hairs; *frond* 0.5-2 m., usually about 0.7-1 m. high, *vernation subgleichenioid*; stipe usually shorter than the blade; *blade* 2-10 dm., usually about 4 dm. long, usually *ovate or broadly ovate*, not ternate, usually tripinnate or tripinnate-pinnatifid; *rachis glabrous* or slightly pubescent; pinnae and pinnules short-acuminate to obtuse; pinnules usually nearly at right angles to the costa, sometimes at an oblique angle; costules slightly pubescent beneath and less so above; penultimate segments pinnatifid, pinnate or pinnate-pinnatifid; longest entire segment or entire part of a segment from three to five, usually about four, times as long as broad; ultimate segments usually straight, adnate or broadest at the base, the *upper surface glabrous*, rarely very slightly pubescent along the midnerve, the margin glabrous, slightly pubescent, or rarely quite pubescent, the *lower surface* usually *densely subappressed-lanuginose pubescent*, sometimes only slightly so; *fertile and sterile indusium ciliate* and sometimes also *pubescent* on the outer surface, rarely becoming glabrous with age, the *fertile* usually about 0.3 mm. wide, the *sterile*



usually about 0.2 mm. wide, the fertile portion broader than the sterile on the same segment, or no broader.

TYPE: *Gaudichaud*, in Herb. Muséum d'Histoire Naturelle, Paris (not seen).

TYPE LOCALITY: Hawaiian Islands.

Var. *decompositum* is closely related to vars. *Feei* and *pubescens*. However, it has a nearly glabrous rachis rather than a pubescent one as in those two varieties and the upper surface of the segments is glabrous or rarely slightly pubescent only along the midnerve rather than pubescent and usually with a glabrous midnerve. The sterile indusium is only about half as broad as that of var. *Feei* and on the average it is not as large a plant as var. *pubescens*. The margin of the segments is sometimes glabrous or nearly so rather than pubescent. The subappressed pubescence on the lower surface of the segments is characteristic though not always well defined.

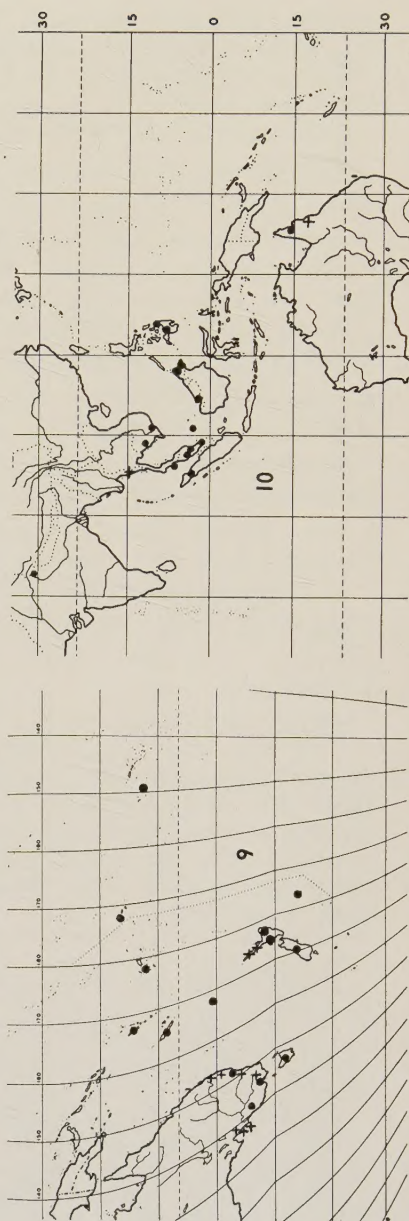
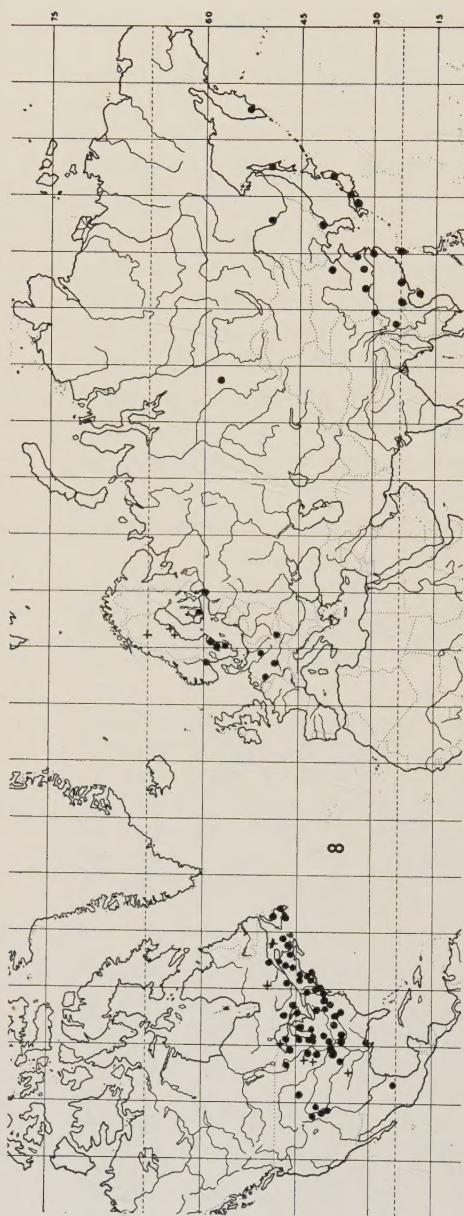
Var. *decompositum* is a part of the small element of the Hawaiian flora that is related to the American flora.

It occurs exclusively in the Hawaiian Islands, where it grows along field borders, in virgin land, on craters, on bare eroded slopes, on open grassy slopes and in thickets from 300 m. up to 2700 m.

HAWAIIAN ISLANDS.—KAUAI: June 22, 1895, A. A. Heller 2416 (F, G, NY, US). OAHU: Waianae Mts., Honouliuli, May 2, 1937, Fosberg 13810 (G); Koalau Mts., March 29, 1933, Fosberg 9320 (G); Wahiawa, June 3, 1909, Forbes (NY). MOLOKAI: Kahuaawi, May 30, 1928, Degener 3558 (NY, US). LANAI: Kaokahi, Nov. 28, 1935, Fosberg 12429 (G). MAUI: Aug. 22, 1933, Fosberg 9943 (G). HAWAII: Kilauea Bird Park, Aug. 5, 1925, Neal (NY).

6. *PTERIDIUM AQUILINUM* var. *LATIUSCULUM* (Desv.) Underw. ex Heller, Cat. N. Am. Pl. Ed. 3, 17 (1909). Plate 650, FIG. 8, PLATE 652, FIG. 1, MAP 8. Illustrations: Tilton, Fern Lover's Comp. 48, 49 (1922); Tryon et al., Ferns of Wis. 18, 19 (1940), *habitat*; Svensk Bot. 2: t. 90 (1803).

*Pteris caudata* L. sensu Schk. Krypt. Gew. 88 (1809), in part, pl. 96b, a. *Pteris ciliata* Willd. ex Schk. Krypt. Gew. 89 (1809), in synonymy. *Pteris lanuginosa* Spreng. Nova Acta 10: 231 (1821). *Pteris Sprengelii* Steud. Nom. Bot. 2: 358 (1824). *Pteris latiuscula* Desv. Mém. Soc. Linn. 6<sup>2</sup>: 303 (1827). *Pteris aquilina* L. var. *pubescens* Kze. Linnaea 13: 142 (1839), as to



Ranges of *PTERIDIUM AQUILINUM* var. *LATIUSCULUM* (map 8); var. *ESCULENTUM* (map 9); var. *YARRABENSE* (map 10).



basinym, *Pteris lanuginosa* Spreng., not as to plant. *Pteridium latiusculum* (Desv.) Hieron. ex Fries, Wiss. Ergebn. Schwed. Rhodesia-Kongo Exp. **1**: 7 (1914). *Cincinalis latiuscula* (Desv.) Vict. Contrib. Lab. Bot. Univ. Montréal no. 2, 71 (1923), nomen provisorium. *Pteridium aquilinum* (L.) Kuhn var. *japonicum* Nakai, Bot. Mag. Tokyo **39**: 106 (1925), ex char. *Pteris latiuscula lanuginosa* Small, Ferns N. Y. **241** (1935), in synonymy. *Pteridium latiusculum* (Desv.) Hieron. ex Fries var. *verum* Wherry, Am. F. Journ. **27**: 58 (1937). *Pteridium aquilinum* (L.) Kuhn f. *glabrum* Tardieu-Blot and C. Chr. in Lecomte, Fl. Gen. Indo-Chine **7**<sup>2</sup>: 138 (1939). *Pteridium japonicum* (Nakai) Tardieu-Blot and C. Chr. in Lecomte, Fl. Gen. Indo-Chine **7**<sup>2</sup>: 138 (1939), in synonymy.

The earliest varietal name, *Pteris aquilina* L. var. *pubescens* Kze., cannot be transferred to *Pteridium aquilinum* because of *Pteridium aquilinum* var. *pubescens* Underw.

Growing tip of the rhizome usually naked, or with a few whitish hairs, rarely with a tuft of dark hairs; frond 0.3–1.5 m., usually about 0.5–1 m. high, vernation equal; stipe longer or shorter than the blade; blade 2–8 dm., usually about 5 dm. long, usually broadly triangular, rarely broadly ovate or ovate, often ternate, usually tripinnate or tripinnate-pinnatifid, sometimes bipinnate-pinnatifid; rachis usually glabrous or subglabrous, sometimes slightly pubescent; pinnae and pinnules subacute to obtuse; pinnules usually at an oblique angle to the costa, rarely nearly at right angles; costules slightly pubescent beneath and less so above, or glabrous; penultimate segments usually pinnate or pinnate-pinnatifid; longest entire segment or entire part of a segment from three to seven, usually about four, times as long as broad; ultimate segments usually straight, adnate or broadest at the base, the upper surface glabrous or subglabrous, the margin pubescent, or rarely subglabrous, the lower surface usually pubescent only along the midnerve, rarely slightly pubescent between the margin and the midnerve; fertile and sterile indusium usually glabrous, rarely the fertile slightly pubescent on the outer surface or ciliate, and the sterile slightly ciliate, the fertile 0.25–0.4 mm. wide, the sterile 0.1–0.2 mm. wide, the fertile portion broader than the sterile on the same segment.

TYPE: Sheet labeled *Pteris latiuscula* Desv., Herb. Desvaux in Herb. Muséum d'Histoire Naturelle, Paris (not seen). Photograph of type in U. S. National Herbarium and Gray Herbarium (seen).

TYPE LOCALITY: Newfoundland and St. Pierre.

In northern Europe, Kamtchatka and occasionally throughout its range in North America, plants of var. *latiusculum* occur that have the sterile indusium slightly ciliate and the lower surface of the blade somewhat pubescent between the margin and the midnerve. Such plants in North America are discussed under var. *pubescens*. Also, occasionally, the blade is ovate rather than broadly triangular. These are apparently normal variations in any large population of var. *latiusculum*.

In northern Wisconsin and adjacent Michigan, and perhaps more widely distributed, plants with an ovate blade, pubescent beneath between the margin and midrib, and with the sterile indusium ciliate are not uncommon (PLATE 652, FIG. 4). Representative specimens are: Boulder Junction, Vilas Co., Wisconsin, July 3, 1938, *Tryon* 3914 (G); Hersey, Osceola Co., Michigan, June 25, 1938, *Fassett* 19244 (G); Northwest of L'Anse, Baraga Co., Michigan, *Fassett* 19251 (G). They constitute a rather noticeable proportion of the var. *latiusculum* population. An attempt to identify such plants led me into this study of *Pteridium* but I am still unable to give a satisfactory interpretation of them. In the summer of 1940 I made an effort to study them in the field more closely than I had in 1938<sup>20</sup> but heavy late frosts had killed or mutilated most of the Bracken. They may be regarded as a scattered population intermediate between var. *pubescens* and var. *latiusculum*, closely related to the former in the characters given above but, I believe, derived from the latter by rhizomes or spores. Or, there is considerable evidence that they are merely the result of adverse growing conditions such as burning, pasturing, and extremes of exposure and soil sterility. They are found in especially dry, sunny places, often in pastures, fields, railroad rights-of-way and recently burnt-over land.

There is a certain amount of intergradation between var. *latiusculum* and var. *Wightianum*. Some specimens with the leaf-cutting of var. *latiusculum* are slightly pubescent beneath between the margin and the midnerve and have the sterile indusium slightly ciliate, while others have tapering pinnules set at right angles to the costa, as in var. *Wightianum*, and are pubescent beneath only on the midnerve. Such intermediates

<sup>20</sup> See Tryon, Notes on the Ferns of Wisconsin. *Am. F. Journ.* 29: 1 (1939).



are: Kwangtung, China, Jan. 4, 1928, *Tsang* 16704 (F); Kwangtung, China, *Lau* 2353 (G); Canton, China, 1874, *Poli* (Herb. Field Mus. no. 593622); near Kau Fung, Loh Ch'ang Dist., Kwangtung, China, Nov. 2-30, 1932, *Tsang* 20872 (NY, US); Foochow, Fukien Prov., China, *Metcalf* 7406 (US); Wang Shan, Anhwei Prov., China, Aug. 28, 1923, *Ip* (US); Mt. Renger, Java, Sept. 25, 1907, *Buysman* (US).

Var. *latiusculum* may be separated from var. *Wightianum* by its equal rather than gleichenioid veneration, its broadly triangular and ternate rather than ovate-triangular and evenly pinnate blade, its nearly glabrous rather than densely pubescent rachis and its subacute or obtuse rather than long-acuminate pinnae and pinnules. Also the ultimate segments are straight rather than falcate, the lower surface is glabrous except along the midnerve rather than densely pubescent, the fertile and sterile indusium are glabrous or nearly so rather than quite ciliate and the pinnules are at an oblique angle to the costa rather than at right angles.

Vars. *typicum*, *pubescens* and *pseudocaudatum* are also closely related to var. *latiusculum* and the critical differences are discussed under their treatments.

Var. *latiusculum*, in eastern North America and eastern Asia, is another example of the well-known relationship of the floras of those two areas. The localities in the Black Hills of South Dakota and the mountains of Wyoming, Colorado and Nuevo Leon undoubtedly represent relics of a once continuous range, the intervening population perhaps having been wiped out by aridity in the Great Plains Region. I do not have enough data at hand to interpret the occurrence of var. *latiusculum* in northern Europe. It may have survived glaciation in local nunatak areas in Scandinavia and spread since the disappearance of the ice, or it may have spread, since glaciation, westward from unglaciated areas in western Siberia. Var. *latiusculum* is probably more widely distributed in central Asia than Map 8 indicates. Several of the localities in central Asia on Map 1 probably represent var. *latiusculum*.

Var. *latiusculum* grows in pastures, open woods, thickets, on open slopes, in woods, on grassy slopes in abandoned fields and in burnt-over areas, in damp or more often dry, usually sterile

soil; from sea level up to 1500 m. in eastern North America, 2300 m. and 2700 m. in the mountains of Wyoming and Colorado and up to 2000 m. in China.

It ranges from Newfoundland to Minnesota, south to Oklahoma and Tennessee; isolated in Mississippi, Wyoming, South Dakota, Colorado and Nuevo Leon; Sweden south to Germany, east to western Russia; Siberia; Kamtchatka to Amur, south to Formosa, Hainan and Szechuan.

NORTH AMERICA.—SAINT PIERRE: Cape Noir, July 10, 1901, *Arsène* 6 (G); July 10, 1909, *Arsène* 5 (NY). ÎLE MIQUELON: July 27, 1882, *Delamare* 364 (NY). NEWFOUNDLAND: Holyrood, South Arm River, Aug. 23, 1894, *Robinson & Schrenk* 4 (F, G, NY, US); Grand Falls, July 10, 1911, *Fernald & Wiegand* 4281 (G). DOMINION OF CANADA. QUEBEC: Boishébert, Mutton Bay, Saguenay Co., Aug. 15, 1915, *H. St. John* 90010 (G); Seven Islands, Saguenay Co., Aug. 12, 1907, *C. B. Robinson* 873 (NY); Bic, Rimouski Co., Aug. 15, 1927, *Rousseau* 26884 (G); Northwest of Three Rivers, Champlain Co., Aug. 1, 1923, *Chamberlain & Knowlton* (G); Grindstone, Grindstone Island, Magdalen Islands, Aug. 23, 1912, *Fernald, Long & St. John* 6645 (G). PRINCE EDWARD ISLAND: Dundee, Kings Co., Aug. 26, 1912, *Fernald, Long & St. John* 6646 (G). NEW BRUNSWICK: Shediac Cape, July 23, 1914, *F. T. Hubbard* (G). NOVA SCOTIA: Brazil Lake, Yarmouth Co., July 16, 1921, *Bartram & Long* 23003 (G); Digby, July 2–7, 1901, *Howe & Lang* 258 (G, NY). ONTARIO: Moore Lake, Bruce Peninsula, Aug. 26, 1934, *Krotkov* 9606 (G, US); east end of Timagami Lake, Timagami Provincial Forest, Aug. 4–11, 1935, *E. C. & T. G. Yuncker* 5499 (F); Laurier, Parry Sound District, Aug. 13, 1905, *Moyer* (NY). UNITED STATES OF AMERICA. MAINE: Mt. Katahdin, July 14, 1900, *Fernald* (G); Boundary Lake, Aroostook Co., Aug. 12, 1902, *Eggleston & Fernald* (G). NEW HAMPSHIRE: Randolph, Sept. 1, 1903, *A. H. Moore* 1454 (G); Jaffrey, July 25, 1897, *B. L. Robinson* 287 (G). VERMONT: Manchester, July 27, 1898, *Day* 260 (G); Brandon, May 23, 1908, *E. F. Williams* (G). MASSACHUSETTS: Sharon, July, 1905, *S. F. Poole* 307 (G); Tisbury, Martha's Vineyard, June 16, 1917, *F. C. Seymour* 1001 (G, US); Granville, Sept. 19, 1913, *Seymour* 60 (NY). RHODE ISLAND: Barrington, Bristol Co., Sept. 15, 1906, *M. H. Grant* (G). CONNECTICUT: North Guilford, Sept. 30, 1906, *G. H. Bartlett* (G); Southington, Sept. 20, 1898, *Bissell* 830 (G). NEW YORK: Ithaca, Tompkins Co., Sept. 3, 1914, *Metcalf* 1405 (G); Staten Island, July 16, 1906, *Dowell* 4506 (G, US). NEW JERSEY: Budd's Lake, Sussex Co., Aug. 12–14, 1890, *Small* (F). PENNSYLVANIA: Wissahickon



Ravine, Philadelphia Co., July 19, 1924, *Lang* 626 (G); Reading, Berks Co., Sept. 11, 1929, *E. J. Palmer* 36311 (G). MARYLAND: between Oakland and Thayerville, Garrett Co., July 5, 1913, *Tidestrom* 6457 (G); Cumberland, 1894, *Shriver* (NY). DISTRICT OF COLUMBIA: Terra Cotta, June 17, 1888, *Holm* (G). WEST VIRGINIA: White Sulphur Springs, Greenbrier Co., May 14–17, 1914, *Hunnewell* (G); Whitmer, Randolph Co., Sept. 13, 1904, *A. H. Moore* 2221 (G). VIRGINIA: Bull Run Mts., Fauquier Co., June 9, 1935, *Allard* 598 (G, NY); Marion, Smyth Co., June, 1892, *Britton & Vail* (NY). NORTH CAROLINA: near Waynesville, Sept. 5, 1910, *Standley* 5529 (US). MICHIGAN: 4 miles northwest of Calumet, Houghton Co., July 24, 1936, *Hermann* 8264 (NY); Ludington, Mason Co., Sept. 17, 1910, *Chaney* 256 (F, G, US). OHIO: Berea, July, 1897, *Ashcroft* (Herb. Field Mus. nos. 140093, 140094); Hiram, Portage Co., Aug. 15, 1897, *Webb* 265 (G). INDIANA: Millers, Lake Co., July 7, 1908, *Lansing* 2759 (F, G); Lake Oliver, July 16, 1933, *Shoop* (Herb. Field Mus. nos. 907912, 907922). KENTUCKY: Burnt Bridge Ridge, Madison Co., July 7, 1937, *Smith, Hodgdon & Brown* 3625 (G); Pine Mt., Bell Co., Sept., 1893, *Kearney* (US). TENNESSEE: South of Craggie Hope, Cheatham Co., Aug. 20, 1922, *Svenson* 342 (G); Henderson, June, 1892, *Bain* (NY). MISSISSIPPI: Biloxi, June 3, 1898, *Tracy* 5171 (F, NY, US). WISCONSIN: Delavan, July 13, 1919, *Hollister* 146 (G, US); Solon Springs, Douglas Co., Sept. 7, 1930, *Somerville* 41 (G). ILLINOIS: Starved Rock, La Salle Co., Sept. 7, 8, 1914, *Lansing* 3786 (F); Joliet, Sept. 20, 1904, *Skeel* 549 (F); Pine Hills, Union Co., May 6, 1902, *Gleason* 2899 (G). MINNESOTA: St. Cloud, July, 1896, *Campbell* (F); Itasca Park, Clearwater Co., July 16, 1933, *Mayle* 654 (G, NY). IOWA: Fayette Co., July, 1894, *B. Fink* 444 (G, US); Lebanon, July 5, 1897, *Sample* 502 (G, US). MISSOURI: Monteer, Oct. 24, 1907, *Bush* 1146 (G, NY, US); Ironton, June 23, 1897, *Savage & Stull* 328 (F). ARKANSAS: Jasper, Newton Co., June 18, 1932, *D. M. Moore* 32503 (G). SOUTH DAKOTA: Custer, Black Hills, Aug. 19, 1892, *Rydberg* 1192 (NY, US); Pinecrest Camp, Deadwood, 1927, *Haywood* 1115 (F). WYOMING: Jackson's Hole, Lincoln Co., Aug. 11, 1920, *L. B. & E. B. Payson* 2275 (G); Laramie Peak, Albany Co., July 10, 1900, *Nelson* 7518 (G, NY). COLORADO: Rabbit Ear Range, Routt Co., July 18, 1903, *Goodding* 1595 (G, NY, US); Brush Creek, Sept. 9, 1910, *Tidestrom* 4166 (G).—MEXICO: Sierra Madre Mts., Monterey, Nuevo Leon, July 6, 1933, *C. H. & M. T. Mueller* 366, in part (G).

EUROPE.—NORWAY: Bygdö, June 28, 1907, *O. Anderson* (US). SWEDEN. (STOCKHOLM): near Stockholm, Sept. 18, 1887, *A. F. Carlson* (US). ÖSTERGÖTLAND: Aug. 8, 1915, *A. O. Olson* (Herb.

Field Mus. no. 821335); Ljushult, July 21, 1911, *A. O. Olson* (NY); Asunden, Aug. 17, 1915, *A. O. Olson* (NY). KALMAR (SMÅLAND): Kalmar, 1882, *Linddorff* (G).—FINLAND: Nyland, Aug. 20, 1908, *H. Lindberg* 409 (NY). GERMANY: near Berlin, July, 1844, *Gausauge* (G); Hanau, Sept., 1910, *Peipos* (Herb. Field Mus. no. 756316); Nürnberg, Bavaria, Aug. 15, 1910, *Honig* (G). CZECHOSLOVAKIA: Moravia, Sept. 13, 1925, *J. Bily* 103 (G). UNION OF SOVIET SOCIALIST REPUBLICS: St. Petersburg, 1860 (Herb. Field Mus. nos. 29377, 162025).

ASIA.—SIBERIA. TOMSK: near Titovka, Aug. 29, 1928, *Protopopova* (G). KAMTCHATKA: Savoiko, Aug. 29, 1928, *Eyerdam* (G, NY, US); Petropavlovsk, Aug. 6, 1928, *Eyerdam* (F, G, NY, US). PRIMORSK: Vladivostok, May–Oct., 1919, *Topping* 2343 (US). AMUR: Blagowjeschtschensk, 1906, *Karo* (G, US).—SACHALIN: 1872, *Augustinowicz* (G). JAPAN: *Maries* (U. S. Nat. Herb. no. 022422); June, 1896, *Halbrook* 40 (NY); Atago, Oct. 13, 1894, *Stanford* (Herb. Field Mus. no. 825006) (NY); Sakamoto, Aug. 8, 1929, *Dorsett & Morse* 897 (US); Kano San, Kadsusa, Sept., 1888 (U. S. Nat. Herb. no. 22432); Mt. Kano San, Kadsusa, Sept. 7, 1908 (U. S. Nat. Herb. no. 1095365); Yase near Kyoto, June, 1921, *Husimi* (U. S. Nat. Herb. no. 1704754); Nanokawa, Tosa, July 3, 1892 (U. S. Nat. Herb. no. 22439). FORMOSA: *Hancock* 56 (US). CHINA. MANCHURIA: 1931, *Chen* 494 (NY). CHIHLI: Tungling Mts., May 18, 1921, *Cowdry* 1214 (US). KIANG SU: Poa Wha Mt., Chu-Yung, Oct. 10, 1915 (U. S. Nat. Herb. no. 1094030). CHEKIANG: Mo Kan Shan, June 28, 1926, *Cheo & Wilson* 12663 (G). ANHWEI: Chiu Hua Shan, June 28, 1925, *Ching* 8478 (G, NY). HUPEH: 1885–88, *Henry* 3146 (G); Wuchang, June, 1932, *Chung* 9058 (F). KIANGSI: Lu Shan, Sept. 19, 1922, *Steward* 2724 (US). KWANGTUNG: Hong Kong, 1853–56, *Wright* (G, US). HAINAN: Ka Chik Shan, April 25, 1933, *Lau* 1637 (G). YUNNAN: Ping-pien Hsien, June 5, 1934, *Tsai* 60128 (G). SZECHUAN: Mt. Omei, Omei Hsien, 1928, *Fang* 3034 (G), 3231 and 3317 (G, US); Nanchuan Hsien, 1928, *Fang* 5841 (G).—FRENCH INDO-CHINA: Nov., 1921 (U. S. Nat. Herb. no. 1505970).

7. *PTERIDIUM AQUILINUM* var. *PSEUDOCAUDATUM* (Clute) Heller, Cat. N. Am. Pl. Ed. 2, 12 (1900). PLATE 650, FIG. 7, PLATE 652, FIG. 2, MAP 5. Illustration: Blomquist, Ferns of N. Car. 42 (1934).

*Pteris caudata* L. sensu Schk. Krypt. Gew. 88 (1809), in part, Pl. 96b, b. *Pteris novae-angliae* Bory ex Hook. Sp. Fil. 2: 197 (1858), in synonymy. *Pteris aquilina* L. var. *pseudocaudata* Clute, Fern Bull. 8: 39 (1900). *Pteridium aquilinum pseudocaudatum* (Clute) Clute, Fern Bull. 8: 39 (1900), nomen pro-



visorium. *Pteris pseudocaudata* (Clute) Anon. in Index, Proc. Biol. Soc. Wash. **14**: 200 (1901). *Pteris latiuscula pseudocaudata* (Clute) Clute, Fern Bull. **11**: 62 (1903), nomen provisorium. *Pteridium latiusculum pseudocaudatum* (Clute) Maxon, Am. F. Journ. **9**: 44 (1919). *Filix-foemina aquilina* (L.) Farwell var. *pseudocaudata* (Clute) Farwell, Am. Mid. Nat. **12**: 290 (1931). *Pteris latiuscula* Desv. var. *pseudocaudata* (Clute) E. P. St. John, Am. F. Journ. **25**: 40 (1935).

Growing tip of the rhizome usually with a tuft of dark hairs; frond 0.3–1.5 m., usually about 0.5–1 m. high, vernation equal; stipe longer or shorter than the blade; blade 2–7 dm., usually about 5 dm. long, usually broadly triangular, rarely broadly ovate or ovate, sometimes ternate, bipinnate-pinnatifid or tripinnate, rarely tripinnate-pinnatifid; rachis glabrous; pinnae and pinnules acute to obtuse; pinnules usually at an oblique angle to the costa, rarely at right angles; costules glabrous or less often slightly pubescent; penultimate segments pinnatifid or pinnate, rarely pinnate-pinnatifid; longest entire segment or entire part of a segment from six to fifteen, usually about nine, times as long as broad; ultimate segments usually straight, adnate or broadest at the base, the upper surface glabrous, the margin usually glabrous, rarely slightly pubescent, the lower surface glabrous, or sometimes pubescent along the midnerve; fertile and sterile indusium glabrous, the fertile 0.3–0.4 mm. wide, the sterile 0.1–0.2 mm. wide, the fertile portion broader than the sterile on the same segment.

TYPE: Clute 339, isotype in Herb. New York Botanical Garden (seen).

TYPE LOCALITY: Babylon, Long Island, New York.

It is interesting to note that in 1899, one year before Clute described var. *pseudocaudatum*, Maxon identified Ball 511 as "*Pteris aquilina* L. var. nov." "not typical—approaching *P. caudata* Linn."

Var. *pseudocaudatum* intergrades to a considerable extent with var. *latiusculum*. Intermediate specimens have the leaf-cutting of var. *latiusculum* but are nearly glabrous or have the leaf-cutting approaching var. *pseudocaudatum* and are either glabrous or have a pubescent margin and midnerve. Such specimens are: Hammonton, New Jersey, May 30, 1919, Killip 2260 (US); Bladensburg, Maryland, July 31, 1919, Maxon 6461 (G); Table Rock, North Carolina, June, 1879 (Herb. Field Mus. no. 315115, U. S. Nat. Herb. no. 22450); near White Sulphur Springs, Greenbrier Co., West Virginia, Aug. 29, 1903, Mackenzie

381 (NY); Henderson, Tennessee, June, 1892, *Bain* 162 (G); Wasioto, Bell Co., Kentucky, Sept., 1893, *Kearney* (NY); Bowling Green, Kentucky, July, 1891, *Price* (NY). *Lansing* 513, West Pullman, Illinois, Sept. 18, 1898 (F) approaches var. *pseudocaudatum*. This strongly suggests that typical var. *pseudocaudatum* occurs at the southern tip of Lake Michigan, and it has been reported from the Dunes Region,<sup>21</sup> but I have not seen any specimens.

Var. *pseudocaudatum* may be separated from var. *latiusculum* by the glabrous or subglabrous rather than pubescent margin of the segments, the usually glabrous rather than pubescent mid-nerve and the long and narrow rather than relatively short and broad segments. Also the growing tip of the rhizome usually has a tuft of dark hairs.

Although not closely related, var. *africanum* approaches var. *pseudocaudatum* in some characters and the differences are discussed under the former variety.

Var. *pseudocaudatum* grows in open woods, pastures, thickets, in burnt-over areas and abandoned fields, usually in dry sterile soil but sometimes in fairly damp or rich places.

It is primarily of Coastal Plain distribution: Cape Cod, Massachusetts, and Long Island, New York, to Florida and Texas; also inland in North Carolina, Tennessee, West Virginia, Ohio, Indiana, Missouri, Arkansas and Oklahoma.

UNITED STATES OF AMERICA.—MASSACHUSETTS: Harwich, Barnstable Co., Sept. 2, 1918, *Fernald & Long* 15914 (Herb. New Eng. Bot. Club). NEW YORK: Babylon, Long Island, Sept. 8, 1898, *Clute* 339 (NY), isotype of *Pteris aquilina* var. *pseudocaudata* Clute. NEW JERSEY: Hammonton, Aug. 19, 1879, *Kitchel* (G); Atsion, Burlington Co., Aug. 10, 1926, *Benner, Long & Bassett* (G). DELAWARE: Seaford, Aug., 1874, *Canby* (Herb. Field Mus. no. 149427); Laurel, Sussex Co., Aug. 19, 1880, *Commons* (G). MARYLAND: 3 miles southeast of Ridgely, Caroline Co., Sept. 24, 1938, *Wherry* (G). WEST VIRGINIA: Rickett's Place, Cabell Co., Sept. 13, 1936, *F. A. Gilbert* 519 (F, NY). VIRGINIA: Ocean View, Norfolk Co., Oct. 4, 1912, *Tidestrom* 6184 (G); Buckroe, May 18, 1912, *B. L. Robinson* 341 (G); Great Dismal Swamp, June 18, 1936, *Fulling* (NY). NORTH CAROLINA: Tryon, Polk Co., May, 1918, *Millspaugh* 4083 (F); 4 miles east of Hamlet, Richmond Co., July 2, 1927, *Wiegand &*

<sup>21</sup> Peattie, Fl. Ind. Dunes, 29 (1930): "acc. to Clute".

*Manning* 21 (G); Goldsboro, Wayne Co., June 21, 1935, *Correll* 1382 (G). SOUTH CAROLINA: near Navy Yard, Charleston, May 4, 1912, *B. L. Robinson* 198 (G); Myrtle Beach, Horrey Co., June 12, 1936, *Correll* 5218 (G); Laurel Hill, July 6, 1936, *Tarbox* 735 (NY). GEORGIA: Sumter Co., July 24, 1901, *Harper* 1110 (F, G, NY, US); Near Darien, McIntosh Co., June 20, 1936, *Correll* 5456 (G). FLORIDA: Warrenton, May 23, 1903, *Tracy* 8633 (F, G, US); Eustis, Lake Co., May 1–15, 1894, *Nash* 638 (F, G, NY, US). KENTUCKY: Mammoth Cave Road, Edmonson Co., July 2, 1916, *King* 121 (F). TENNESSEE: Look-out Mt., *Eggleston* (NY). OHIO: Salem Township, Meigs Co., Oct. 10, 1931, *C. H. Jones* (Herb. Ohio U.). INDIANA: 1 mile east of Taswell, Crawford Co., Aug. 17, 1913, *Deam* 13976 (Deam Herb.);  $\frac{1}{2}$  mile south of Emison, Knox Co., Sept. 2, 1939, *Tryon* 4268 (G). ALABAMA: Mobile Co., June, 1905, *Dukes* (G); near Fairfax, Chambers Co., Aug. 17, 1936, *Correll* 6562 (G); Auburn, Lee Co., Oct. 14, 1897, *Earle & Baker* (NY). MISSISSIPPI: West of Kosciusko, Attala Co., May 17, 1933, *C. A. & U. F. Weatherby* 6300 (G, NY, US); French Camp, April 28, 1899, *I. M. Clute* 54 (F, NY). MISSOURI: Monteer, May 14, 1901, *Bush* 474 (G); Chadwick, Christian Co., Oct. 5, 6, 10, 1915, *Eggleston* 12187 (NY); Webb City, Jasper Co., Aug. 22, 1920, *E. J. Palmer* 18788 (NY). ARKANSAS: Nashville, Howard Co., Oct. 19, 1932, *Demaree* 9952 (G); West Otis, Sevier Co., July 26, 1937, *Brinkley* 256 (F); Wilmar, Drew Co., Oct. 12, 1936, *Demaree* 14008 (NY). LOUISIANA: Alexandria, May 31, 1899, *C. R. Ball* 511 (F, G, NY, US); Chapin, Natchitoches Parish, Oct. 5, 1915, *E. J. Palmer* 8845 (NY). OKLAHOMA: Page, LeFlore Co., Sept. 9, 1913, *Stevens* 2715 (G, US); Idabel, McCurtain Co., May 29, 1916, *Houghton* 3909 (G, NY). TEXAS: 10 miles south of Yellow Pine, Sabine Co., Oct. 3, 1934, *Cory* 10750 (G); Huntsville, June 3–12, 1908, *Dixon* 122 (F); Houston, Harris Co., May 18, 1917, *E. J. Palmer* 11942 (NY).

8. *PTERIDIUM AQUILINUM* var. *AFRICANUM*<sup>22</sup> Bonap. Notes Ptérid. **1**: 62 (1915). PLATE 650, FIG. 6, PLATE 652, FIG. 3, MAP 6.

*Pteridium \*centrali-africanum* Hieron. ex Fries, Wiss. Ergebn. Schwed. Rhodesia-Kongo Exp. **1**<sup>1</sup>: 7 (1914). *Pteridium aquilinum* (L.) Kuhn var. *caudatum* (L.) Sadebeck f. *africanum* (Bonap.) Bonap. Notes Ptérid. **14**: 321 (1923).

Growing tip of the rhizome with a tuft of dark hairs; frond 0.6–1 m. high, *vernation gleichenioid*; stipe shorter than the blade; blade 4–8 dm. long, *ovate to broadly ovate*, not ternate, tripinnate-pinnatifid, or more often quadripinnate; rachis glabrous or subglabrous; pinnae and pinnules acute to obtuse;

<sup>22</sup> Described under ssp. *caudatum*.



*pinnules at an oblique angle to the costa*; costules glabrous to slightly pubescent; penultimate segments pinnate; longest entire segment or entire part of a segment from five to eight times as long as broad; ultimate segments usually straight, at least some, often many, *narrowed at the base*, the upper surface glabrous, the *margin glabrous*, the *lower surface glabrous* or very slightly pubescent on the midnerve; *fertile and sterile indusium glabrous*, the fertile usually 0.3 mm. wide, the sterile 0.1–0.2 mm. wide, the fertile portion broader than the sterile on the same segment, or no broader.

TYPE: *Busse 944*, in Herb. Muséum d'Histoire Naturelle, Paris (not seen).

TYPE LOCALITY: "Afrique Orientale allemande. Magaba-Thal."

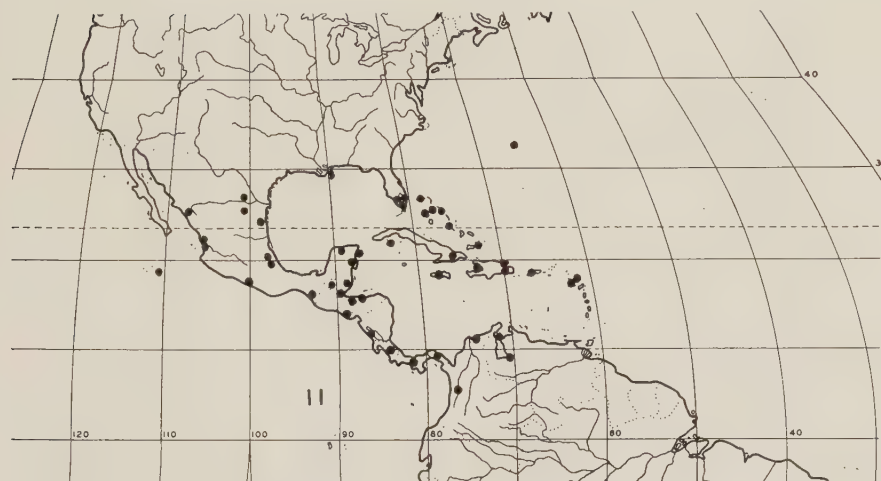
Var. *africanum* may be separated from var. *typicum* by its more finely cut, often quadripinnate, blade, its glabrous rather than pubescent rachis and its glabrous rather than ciliate fertile and sterile indusium. Also the pinnules are at an oblique angle to the costa rather than at right angles and the ultimate segments are usually narrowed at the base and glabrous or subglabrous rather than adnate or broadest at the base and densely pubescent beneath. It differs from var. *pseudocaudatum* in its gleichenioid rather than equal veneration, its ovate or broadly ovate rather than broadly triangular blade and in that the ultimate segments are usually narrowed rather than adnate or broadest at the base.

Var. *africanum* grows in dry moderately light woods, in virgin forest and in open grassland in tropical Africa, up to 1400 m.

AFRICA.—BELGIAN CONGO: Stanley Pool, Sept., 1883, *H. H. Johnston* (U. S. Nat. Herb. no. 22427); Elizabethville, Dec. 30, 1919, *Shantz 513* (US); Albertville, 1931, *Lugen 89* (G). PORTUGUESE WEST AFRICA: Near Cuanza River, Sept. 24, 1923, *A. G. Curtiss 358* (G). UNION OF SOUTH AFRICA: Ndola, northern Rhodesia, *Stevensen 400* (US). TANGANYIKA (GERMAN EAST AFRICA): N'Gano-N'Gano, Urundi, March 17, 1919, *Schantz 757* (US).

PTERIDIUM AQUILINUM ssp. CAUDATUM (L.) Bonap. Notes Ptérid.  
1: 62 (1915)

Growing tip of the rhizome with a tuft of dark hairs; rachis glabrous to slightly pubescent, rarely densely pubescent; costae glabrous to moderately pubescent; pinnules usually nearly at right angles to the costa, rarely at a somewhat oblique angle;



Ranges of *PTERIDIUM AQUILINUM* var. *CAUDATUM* (map 11); var. *ARACHNOIDEUM* (map 12).

longest entire segment or entire part of a segment variable, from four to seventeen times as long as broad; *ultimate segments* usually linear to long-linear, sometimes ovate or oblong-ovate, mostly *decurrent or more strongly decurrent than surcurrent*, sometimes most, but not all, of the segments adnate, the upper surface glabrous to moderately pubescent, the *lower surface* usually *appressed-pubescent with straight hairs or arachnoid-pubescent*, rarely sublanuginose or glabrous, usually *having a farinaceous appearance* (PLATE 650; FIG. 13), fertile indusium 0.3–0.5 mm. wide, the sterile 0.1–0.35 mm. wide. MAP 1 (stars).

9. *PTERIDIUM AQUILINUM* var. *CAUDATUM* (L.) Sadebeck,<sup>23</sup> Jahrb. Hamb. Wiss. Anst. **14**: Beiheft 3, 5 (1897), as to indicated basynym *Pteris caudata* L., not as to plant. PLATE 650, FIGS. 9, 12, PLATE 653, FIG. 4, MAP 11. Illustrations: Plumier, Pl. Amer. t. 22 (1693); Jacquin, Ic. Pl. Rar. **3**: t. 645 (1786–1793); Britton, Fl. Bermuda, 419 (1918).

*Pteris caudata* L. Sp. Pl. Ed. 1, **2**: 1075 (1753). *Pteris aquilina* L. var. *caudata* (L.) Link, Hort. Berol. **2**: 33 (1833). *Allosorus caudatus* (L.) Pr. Tent. Pterid. 154 (1836). *Pteris aquilina* L. var. *mexicana* Fée, Mém. Fam. Foug. **8**: 114 (1857). *Pteris caudata* L. var. *mexicana* Fée, Mém. Fam. Foug. **9**: **8** (1857), nomen nudum. *Ornithopteris caudata* (L.) J. Sm. Hist. Fil. 298 (1875). *Cincinialis caudata* (L.) Trevis. Atti Soc. Ital. sc. nat. **17**: 239 (1875). *Pteridium caudatum* (L.) Maxon, Proc. U. S. Nat. Mus. **23**: 631 (1901). *Pteridium aquilinum* (L.) Kuhn var. *caudatum* (L.) Sadebeck f. *glabratum* Hieron. Hedwigia **48**: 246 (1909). *Pteridium aquilinum* (L.) Kuhn var. *caudatum* (L.) Sadebeck f. *pubescens* Hieron. Hedwigia **48**: 246 (1909). *Filix-foemina aquilina* (L.) Farwell var. *caudata* (L.) Farwell, Am. Mid. Nat. **12**: 290 (1931).

Frond 0.6–7 m., usually about 1.2–2.5 m. high, the taller fronds scandent, vernation not clearly observed, apparently gleichenioid; stipe usually about as long as the blade; blade 0.3–4 m., usually about 0.6–1 m. long, triangular to broadly ovate or long-triangular in large plants, tripinnate, or more usually tripinnate-pinnatifid or quadripinnate; costules of the penultimate segments usually glabrous, sometimes slightly pubescent above and beneath with long white hairs, rarely pubescent above with short white hairs, or beneath with dark or bicolorous hairs; *free lobes not present* along the rachis, costae and costules; ultimate segments usually linear or long-linear, sometimes oblong-ovate or ovate, the margin glabrous or infrequently slightly pubescent, the *lower surface* usually *densely appressed-pubescent with long straight hairs*, rarely arachnoid-pubescent, sometimes glabrous, *having a farinaceous appearance* except in the glabrous

<sup>23</sup> On many of my annotation labels the combination is accredited to Underwood (1900).



forms, the *midnerve usually glabrous*, rarely pubescent with dark or bicolorous hairs, *only rarely membranous wings present* along the veins and midnerve; fertile and sterile indusium usually glabrous, sometimes slightly or densely ciliate, the *fertile portion broader than the sterile* on the same segment; *cells of the sterile indusium large, in fairly definite rows* (PLATE 650, FIG. 12).

TYPE: Specimen in the Linnaean Herb. (not seen). Linnaeus had two specimens labelled *Pteris caudata* in his herbarium in 1753.<sup>24</sup> One is apparently var. *pseudocaudatum* and the other is clearly var. *caudatum*. The latter specimen is taken as the type. Since Linnaeus' description in the Species Plantarum was taken from his Hortus Cliffortianus, a specimen, if there is one, in the Clifford Herbarium might be considered to be the type. However, since there is a perfectly good specimen available in Linnaeus' own herbarium, it seems best to designate that as the type. Although one of Linnaeus' specimens is apparently var. *pseudocaudatum*, the application of his name is perfectly clear from the figures and localities cited by him.

TYPE LOCALITY: West Indies. Linnaeus, Sp. Pl.: "Jamaica, Dominica.", Hort. Cliff.: "Santo Domingo, Jamaica etc."<sup>25</sup>

The typical phase of var. *caudatum*, with the segments long and narrow and remote, occurs mainly in the West Indies, Florida and in the coastal regions of northern South America, Central America and Mexico. At the higher altitudes, mostly in Central America and Mexico, there is a phase with the segments relatively short and broad and approximate. The extremes of this phase (Lago San José, Porto Rico, July 15, 1912 (U. S. Nat. Herb. no. 566772); San Jose, Tamaulipas, Mexico, 600–1100 m., 1902, *Kemp* (NY); San Rafael de Norte, Nicaragua, March 25, 26, 1917, *Miller & Griscom* 157 (US); Costa Rica, 1800 m., Aug. 2, 1933, *Solis* 277 (F); Columbia, *Charetier* 33 (NY, US); El Salvador, 1200–1500 m., *Standley* 21537; Nicaragua, 850 m., *Maxon, Harvey & Valentine* 7421) are well marked, but there is a great deal of intergradation from one phase to the other. In fact, almost a third of the specimens I have examined are intermediate, and the ranges overlap considerably in individual

<sup>24</sup> Mr. C. A. Weatherby has kindly made his notes on the Linnaean Herbarium available to me.

<sup>25</sup> Linnaeus, Hortus Cliffortianus, 473 (1737).

cases. I do not believe that this variation can reasonably be given varietal status.

Occasional specimens, especially of the "compact" phase mentioned above, but also of the typical phase, have the segments only slightly decurrent but these can usually be placed in var. *caudatum* by the characteristic pubescence.

*Anthony* 400, Lower California, has the lower surface of the segments appressed-pubescent with short hairs as is often the case in var. *esculentum*.

Var. *caudatum* can be distinguished from var. *esculentum* by its lack of free lobes along the rachis, costae and costules; and the fertile indusium is broader than the sterile on the same segment rather than usually no broader. Also the glabrous phases of var. *caudatum* do not have a farinaceous appearance.

Var. *caudatum* is most closely related to var. *arachnoideum*; the differences are discussed under that variety.

It grows in clearings, rough pastures, on dry hillsides, in cut-over forest land, in fresh-water marshes, in pinelands, scrublands and in shady rocky places, mostly at the lower altitudes but up to 2000 m. in Central America and Mexico, and 3000 m. in Venezuela; and from 1000 m. to 1300 m. in the Revillagigedo Islands.

It occurs from Bermuda to Florida, West Indies, Mexico, Central America and northernmost South America.

UNITED STATES OF AMERICA.—FLORIDA: Fort Myers, Lee Co., June 1, 1916, *J. P. Standley* 213 (F, G, NY, US); Cape Sable, July, *A. H. Curtiss* 3705\* (F, G, NY, US).

BERMUDA: Devonshire Marshes, Aug. 31–Sept. 20, 1905, *Brown & Britton* 159 (F, G, NY, US).

WEST INDIES:—BAHAMA ISLANDS: Near Nassau, Feb. 11, 1903, *A. H. Curtiss* 74 (F, G, NY, US); Orange Creek and vicinity, Cat Island, Feb. 27, 28, 1907, *Britton & Millspaugh* 5754 (F, NY). CUBA: Monte Verde, Jan.–July, 1859, *Wright* 872 (F, G, NY, US); Josephina, north of Jaguey, Yateras, Oriente, April 23, 1907, *Maxon* 4129 (G, NY, US). JAMAICA: Mulgrove, north of Ipswich, St. Elizabeth, April 1, 1920, *Maxon & Killip* 1488 (F, G, NY, US). HISPANIOLA: Anse Galette, Gonave Island, Haiti, March 3–14, 1920, *Leonard* 3210 (F, G, US), 3208 (NY); Vicinity of Mission, Haiti, April 17–May 4, 1920, *Leonard* 3916 (US); San Lorenzo Bay, south coast of Samana Bay, Dominican Republic, April 5–11, 1921, *Abbott* 1275 (G, US); Province of

Barahona, Dominican Republic, July, 1911, *Fuertes* 1053 (F, G, NY, US). PORTO RICO: Santurce, Jan. 22, 1903, *A. A. Heller* 6446 (F, G, NY, US). MONTSERRAT: *Turner* (U. S. Nat. Herb. no. 428409). ANTIGUA: (US).

MEXICO.—Islands off the coast of Lower California and on the adjacent mainland, March–June, 1897, *Anthony* 400 (F, G, NY, US). NUEVO LEON: Sierra Madre, July 6, 1933, *C. H. & M. T. Mueller* 366, in part (G). TAMAULIPAS: La Vegonia, San Jose, July 5, 1930, *Bartlett* 10096 (US). SINALOA: Sierra de Chabbarria, 1927, *Ortega* 4079 (US). NAYARIT (TERR. TEPIC): Jan. 5–Feb. 6, 1892, *E. Palmer* 1948 (G, US); Jalisco, Nov. 11, 1925, *Ferris* 5958 (G, US). VERA CRUZ: Mt. Orizaba, Aug. 21, 1891, *Seaton* 110 (F, G, NY); near Jalapa, May 12, 1900, *Pringle* 8342 (G, NY, US). COLIMA: Socorro Island, Revillagigedo Islands, May 8, 1925, *Mason* 1662 (G, US). GUERRERO: Montes de Oca, San Antonio-Buenos Aires, May 5, 1938, *Hinton* 14083 (G, US). OAXACA: Toluca, June, 1937, *L. Williams* 9614 (F). CHIAPAS: Tacnalpan, July 28, 1890, *Rovirosa* 835 (G, NY). YUCATAN: Tuxpena, Campeche, March 23, 1932, *Lundell* 1431 (F). TERR. QUINTANA ROO: Cozumel Island, Feb. 20, 1899, *Millspaugh* 1551 (F, G).

CENTRAL AMERICA.—BRITISH HONDURAS: Big Creek, April 27, 1929, *Schipp* 190 (F, G, NY, US). GUATEMALA: Vaxactum, Dept. Peten, April 7, 1931, *Bartlett* 12521 (F, US); Vicinity of Puerto Barrios, Dept. de Izabal, June 2–6, 1922, *Standley* 25028 (US). EL SALVADOR: Volcan de San Vicente, Dept. San Vicente, March 7, 8, 1922, *Standley* 21537 (G, US). HONDURAS: San Pedro Sula, Dept. Santa Barbara, May, 1888, *Thieme* (J. D. Smith no. 5650) (G, NY, US); Ceiba, Oct. 18, 1916, *Dyer* A134 (F, G, US). NICARAGUA: Casa Colorado and vicinity, south of Managua, June 27, 1923, *Maxon, Harvey & Valentine* 7421 (G, US). COSTA RICA: 1881, *J. J. Cooper* (Herb. Field Mus. no. 347710, G, U. S. Nat. Herb. nos. 22440, 154190); San Jose, Prov. San Jose, 1887, *J. J. Cooper* (J. D. Smith no. 6018) (US). PANAMA: Pedro Miguel, Jan. 27, 1918, *Killip* 2825 (US); vicinity of El Boquete, Chiriqui, March 2–8, 1911, *Maxon* 4926 (US).

SOUTH AMERICA.—COLUMBIA: Santa Marta, near Onaca, Aug. 22, 1898–1901, *H. H. Smith* 1088 (F, G, NY, US); Vicinity of Medellin, 1911, *Charetier* 33 (NY, US). VENEZUELA: 2½ miles east of Merida, State of Merida, Jan. 23, 1931, *Reed* 210 (US).

10. *PTERIDIUM AQUILINUM* var. *ARACHNOIDEUM* (Kaulf.) Herter, Rev. Sudam. Bot. 5: 21 (1937).<sup>26</sup> PLATE 650, FIGS. 10, 13, 14, PLATE 653, FIG. 3, MAP 12. Illustrations: Vellozo, Fl. Flum. 11: t. 80 (1827); Christ, Geog. Farne, Fig. 9 (1910), *habitat*.

<sup>26</sup> Combination incorrectly attributed to Baker.



*Pteris psittacina* Pr. Delic. Prag. **1**: 185 (1822). Although I have not seen Presl's type, his description clearly refers his name to *Pteridium aquilinum* and the locality, Rio de Janeiro, to var. *arachnoideum*. Material recently referred to *Pteridium psittacinum* represents juvenile leaf-forms of var. *arachnoideum* and var. *caudatum*. The leaf-cutting of young plants of these varieties is considerably different from the mature condition and the typical types of pubescence are not developed. *Pteris campestris* Schrad. Gött. gel. Anz. **1824**<sup>1</sup>: 871 (1824). *Pteris arachnoidea* Kaulf. Enum. Fil. 190 (1824). *Allosorus psittacinus* (Pr.) Pr. Tent. Pterid. 153 (1836), as *A. psitaccinus*. *Allosorus arachnoideus* (Kaulf.) Pr. Tent. Pterid. 153 (1836). *Pteris aquilina* L. var. *arachnoidea* (Kaulf.) D. C. Eaton, Proc. Amer. Acad. n.s. **8**: 203 (1861). *Pteris Gardneri* Pr. ex Ettingsh. Denkschr. Ak. Wiss. Wien, **23**: 42 (1864). *Aquilina Gardneri* Pr. ex Ettingsh. Farnkr. 91 (1865), in synonymy. *Pteris aquilina* L. var. *psittacina* (Pr.) Baker in Martius, Fl. Brasil. **1**<sup>2</sup>: 404 (1870). *Cincinalis arachnoidea* (Kaulf.) Trevis. Atti Soc. Ital. sc. nat. **17**: 239 (1875). *Pteridium aquilinum* (L.) Kuhn var. *esculentum* (Forst.) Kuhn f. *arachnoideum* (Kaulf.) Hieron. Hedwigia **48**: 246 (1909). *Pteridium arachnoideum* (Kaulf.) Maxon, Journ. Wash. Acad. Sci. **14**: 89 (1924). *Filix-foemina aquilina* (L.) Farwell var. *arachnoidea* (Kaulf.) Farwell, Am. Mid. Nat. **12**: 290 (1931). *Pteridium psittacinum* (Pr.) Maxon, Proc. Biol. Soc. Wash. **46**: 141 (1933).

Frond 1–3 m. high, vernation not clearly observed, apparently gleichenioid; stipe usually shorter than the blade; blade 0.5–2 m. long, ovate-triangular to long-triangular in large plants, tripinnate to quadripinnate; costules of the penultimate segments usually pubescent beneath and less so above with short white and also dark or bicolorous hairs, sometimes glabrous; *free lobes present* along the rachis, costae and costules; ultimate segments ovate to linear, the margin often pubescent, the *lower surface arachnoid-pubescent*, rarely appressed-pubescent with short straight hairs, or glabrous, nearly always *having a farinaceous appearance*, the *midnerve* usually *pubescent with dark or bicolorous hairs, membranous wings* usually *present* along the veins and midnerve (PLATE 650, FIG. 14); fertile and sterile indusium ciliate and sometimes also pubescent on the outer surface, or glabrous, the *fertile portion no broader than the sterile* on the same segment; *cells of the sterile indusium small, irregularly arranged* (cf. PLATE 650, FIG. 11).

TYPE: *Chamisso*, probably at Berlin (not seen).

TYPE LOCALITY: Brazil.

*Riedel*, Brazil, "Ex. herb. hort. Petropolitani" (G) and *Curran* 128, Bahia, Brazil (G, US) differ from typical var. *arachnoideum* in having no free lobes along the rachis, costae and costules.

The following are intermediate between this and var. *caudatum*. *Hitchcock* 17031, Penal Settlement, British Guiana, Dec. 3-9, 1919 (G, US) has free lobes present and a farinaceous appearance, even though glabrous, as in var. *arachnoideum* but has the fertile indusium broader than the sterile as in var. *caudatum*; *Heller* 4468, 14 miles northeast of Mayaguez, Porto Rico, Feb. 1, 1900 (G, F, NY, US) and *Maxon* 4075, San Piedra, Oriente, Cuba, April 14, 1907 (G, US) are similar to var. *caudatum* in characters of pubescence and of the indusium but they have a few free lobes as in var. *arachnoideum*; *Rose & Painter* 7595, Jalisco, Mexico (US) is arachnoid-pubescent but has no free lobes; and *Pennell* 5162, La Cumbre, El Valle, Columbia (US) and *Ariste-Joseph* A207, Bogota, Columbia (US) are arachnoid-pubescent as in var. *arachnoideum* but have the fertile indusium broader than the sterile and have no free lobes as in var. *caudatum*.

Var. *arachnoideum* differs from var. *caudatum* in having free lobes along the rachis, costae and costules rather than not having them; the midnerve is usually pubescent with dark hairs rather than usually glabrous and the fertile portion of the indusium is no broader than the sterile on the same segment rather than broader. Also the lower surface is arachnoid-pubescent rather than appressed-pubescent with straight hairs, the cells of the indusium are smaller and irregularly arranged and membranous wings are usually present on the veins and midnerve beneath rather than usually not present. Even the glabrous phases have a farinaceous appearance beneath.

The differences between var. *arachnoideum* and var. *esculentum*, with which it has often been confused in the past, are discussed under the latter variety.

Var. *arachnoideum* grows on open slopes, in open rocky places, in thickets, forests, grassland, in cleared land and on the edge of forests from the lower elevations up to 3000 m.; and from 300 m. to 700 m. in the Galapagos Islands.

It ranges from the West Indies, Cuba to Trinidad, to southern Mexico, Central America, Galapagos Islands and throughout

South America except the southern portion; also it is apparently absent from most of the Amazon Basin.

WEST INDIES:—CUBA: Monte Verde, Jan.–July, 1859, *Wright* 985 (G); Loma del Gato and vicinity, Sierra Maestra, Aug., 1923, *Hioram & Clement* 6497 (US); Santiago, Santa Ana, March 23, 1902, *Hamilton* 240 (NY). JAMAICA: Vicinity of St. Helens Gap, St. Andrew, March 4, 1920, *Maxon & Killip* 619 (F, G, NY, US). HISPANIOLA: vicinity of Furey, Haiti, May 26–June 15, 1920, *Leonard* 4339 (G, US); Prov. Monte Cristi, Santo Domingo, June 24, 1929, *Ekman* 12990 (NY, US). PORTO RICO: Aug. 28, 1885, *Sintenís* 2658 (G, US). SANTA LUCIA: Ventine Sulphur Springs (Soufrière), May, 1935, *Box* 449 (US). TRINIDAD: St. Ann, March 17, 1920, *Britton, Hazen & Mendelson* 676 (G, NY); 1877–8, *Fendler* 77 (G, NY, US).

MEXICO.—MEXICO: Nanchititla, Temascaltepec, Feb. 14, 1935, *Hinton* 7371 (G, NY). VERA CRUZ: Zacuapan, Dec., 1912, *Purpus* 6191 (F, G, NY, US). GUERRERO: Montes de Oca, San Antonio-Buenos Aires, May 3, 1938, *Hinton* 14069 (G, US). OAXACA: Cuicatlan, June 16–22, 1898, *Conzatti & Gonzalez* 748 (G).

CENTRAL AMERICA.—GUATEMALA: Volcan de Fuego, *Salvin* (G); Yzabal, Dept. Yzabal, *J. D. Smith* 1565 (G, US). EL SALVADOR: Cerro del Guayabal, Jan., 1924, *Calderon* 2008 (G, US). HONDURAS: about 15 miles east of Ceiba, Dept. Atlantida, July 21, 1938, *Yuncker, Koeppe & Wagner* 8555 (NY). NICARAGUA: San Rafael de Norte, March 25, 26, 1917, *Miller & Griscom* 152 (US). COSTA RICA: from Vara Blanca to La Concordia, July 23, 1923, *Maxon & Harvey* 8400 (US); 1901–1905, *Wreckle* (U. S. Nat. Herb. no. 575231); San Ramon, April, 1913 (Herb. Field Mus. no. 404457). PANAMA: Vicinity of Monte Lirio, Prov. Chiriqui, June 27–July 13, 1935, *Seibert* 234, in part (G).

SOUTH AMERICA.—COLUMBIA: Palmira, Dept. El Valle, May 27, 1922, *Pennell & Killip* 6100 (G, NY, US); Santa Marta, Aug. 26, 1898–99, *H. H. Smith* 1091 (NY). VENEZUELA: Maracai, *Vogl* (G); Island of Margarita, Aug. 28, 1903, *J. R. Johnston* 177 (G); Tovar, 1854–5, *Fendler* 104 (G); 1917, *Curran & Haman* 1111 (G, NY). BRITISH GUIANA: Malali, Demerara River, Oct. 30–Nov. 5, 1922, *de la Cruz* 2658 (F, G, NY, US); Mt. Iramaikpang, northwest part of Kanuku Mts., April 22, 1938, *A. C. Smith* 3657 (G). FRENCH GUIANA: Near Cayenne, Oct. 8, 1830, *Leprieur* 100 (F, G, US). ECUADOR: Western San Miguel Mts., Oct. 21, 1933, *Schimpff* 247 (F); Andes, 1857–9, *Spruce* 5601 (G, NY); Wreck Bay, Chatham Island, Galapagos Islands, July 6, 1905–6, *A. Stewart* 996 (F, G, NY, US). PERU:



Estrella, Dept. Ayacucho, May 8, 14, 1929 *Killip & Smith* 23095 (NY, US); Cero de Cusilluyoc, Dept. Cusco, May 3–6, 1925, *Pennell* 13936 (G, NY, US); Tarapoto, Dept. San Martin, Dec., 1929, *L. Williams* 5971 (F). BRAZIL: Pará, Nov., 1913, *Petelot* (Herb. Field Mus. no. 593026); Near Petropolis, July 10–16, 1882, *J. Ball* (G); Mt. Itatiaya, vicinity of Monte Serrat, State of Rio de Janeiro, Dec. 31, 1928, *L. B. Smith* 1587 (F, G, NY, US); São Leopoldo, Rio Grande do Sul, *Rick* 24 (G). BOLIVIA: Incachaca, Dept. Cochabamba, Prov. Chapare, Jan. 24, 1929, *Steinbach* 8927 (F, G); Lacotal, Dept. Cochabamba, Prov. Chapare, Feb. 25, 1929, *Steinbach* 9363 (F, G, NY); Tipuani, April, 1920, *Buchtien* 5271 (F, US). PARAGUAY: Y-acá River, Cordillera Centralis, 1900, *Hassler* 6997 (G); Paraná River, 1909–10, *Fiebrig* 6138 (G). URUGUAY: Catalan, Dept. Artigas, Nov., 1927, *Herter* 996 (NY); Pan de Azucar, Dept. Maldonado, Jan. 21, 1912, *Osten* 5688 (US). ARGENTINA: Fontana, Resistencia, Chaco, Feb., 1933, *Schulz* 727 (G); Dept. Punilla, Prov. Cordoba, March 16, 1939, *Dawson* 588 (G); Prov. de Catamarca, Nov. 11, 1910 (U. S. Nat. Herb. no. 1113401).

11. *PTERIDIUM AQUILINUM* var. *ESCULENTUM* (Forst.) Kuhn, Chaetopt. 347 (1882). PLATE 650, FIGS. 11, 15, PLATE 653, FIG. 1, MAP 9. Illustrations: Domin, Bibl. Bot. **85**<sup>1</sup>: figs. 33, 34 (1914); Schk. Krypt. Gew. t. 97 (1809); Dobbie, New Zealand Ferns, Ed. 3, 183 (1930).

*Pteris esculenta* Forst. Pl. Escul. 74 (1786). *Allosorus esculentus* (Forst.) Pr. Tent. Pterid. 154 (1836). *Pteris auriculata* Goldm. in Meyen, Nova Acta **19**: supp. 1, 458 (1843). *Pteris aquilina* L. var. *esculenta* (Forst.) Hook. fil. Fl. N. Zel. **2**: 25 (1854). *Cincinnatiensis esculenta* (Forst.) Trevis. Atti Soc. Ital. sc. nat. **17**: 239 (1875). *Ornithopteris esculenta* (Forst.) J. Sm. Hist. Fil. 298 (1875). *Pteridium esculentum* (Forst.) Diels in Engl. & Prantl, Nat. Pfl. **1**<sup>4</sup>: 296 (1899). *Pteris aquilina* L. f. *esculenta* Christ in Warb. Monsunia **1**: 68 (1900), without bibliography or reference. *Pteris aquilina* L. f. *caudata* Christ in Warb. Monsunia **1**: 68 (1900), without bibliography or reference. *Pteridium aquilinum* (L.) Kuhn var. *aequipinnulum* Domin, Bibl. Bot. **85**<sup>1</sup>: 162 (1914). *Pteridium aquilinum* (L.) Kuhn var. *pseudocaudatum* Domin, Bibl. Bot. **85**<sup>1</sup>: 161 (1914), not (Clute) Heller. *Pteridium aquilinum* (L.) Kuhn ssp. *esculentum* (Forst.) Bonap. Notes Ptérid. **4**: 116 (1917).

Frond 0.6–3 m. high, veneration subgleichenioid; stipe about as long as the blade; blade 0.3–1.5 m. long, ovate to triangular, tripinnate to quadripinnate; costules of the penultimate segments glabrous above, glabrous to slightly pubescent beneath with white and often also dark hairs; *free lobes* usually *present* along

the rachis, costae and costules; ultimate segments oblong or usually linear, the margin glabrous, the lower surface densely appressed-pubescent with long, or short, straight hairs, always having a farinaceous appearance, the midnerve usually glabrous, sometimes moderately pubescent with white and sometimes also dark hairs, no membranous wings present on the veins and midnerve; fertile and sterile indusium usually glabrous, rarely slightly ciliate, the fertile portion usually no broader than the sterile on the same segment; cells of the sterile indusium small, irregularly arranged (PLATE 650, FIG. 11).

TYPE: Forster, location unknown. A fragment of the type "ex Forster Herb." "collected" by L. M. Underwood is at Herb. New York Botanical Garden (seen).

TYPE LOCALITY: Society Islands. Copeland<sup>27</sup> says that: "The sole Tahitian record is that of Forster . . . its absence from all later collections suggests that it does not beseeem a wild plant to be edible."

Var. *esculentum* differs from var. *arachnoideum* in its pubescence,—appressed with straight hairs rather than arachnoid,—the absence rather than presence of membranous wings along the veins and midnerve and the midnerve usually glabrous or with white hairs rather than pubescent with dark or bicolorous hairs.

*De la Cruz* 2658, British Guiana and *Gleason* 423, Tumatumari, British Guiana, June 18–July 8, 1921 (G), var. *arachnoideum*, approach var. *esculentum* in being appressed-pubescent with short hairs.

The differences between var. *esculentum* and vars. *caudatum* and *yarrabense* are discussed under those varieties.

Var. *esculentum* grows in open places, pastures, thickets and clearings, from sea-level up to 1300 m.

It ranges from Australia to the Society Islands.

AUSTRALIA: *Sassafras*, Victoria, July 3, 1936, *Lothian* (G); Hall's Gap, Grampian Mts., Victoria, Dec., 1912, *Tilden* 848 (F, G); Port Lonsdale, Victoria, Oct.–Nov., 1912, *Tilden* 762 (F, G); Bondi Bay, Sidney, New South Wales, Sept., 1912, *Tilden* 570 (F, G); near Mareton Bay, 1850–51, *Strange* (G); east coast (Nouvelle Hollande), 1845, *Verreaux* 267 (G, US). TASMANIA: *Gunn* (G). NORFOLK ISLAND: 1884, *Metcalfe* (U. S. Nat. Herb. no. 22443). NEW ZEALAND: Whakarewarewa, Nov., 1909, *Leland, Chase & Tilden* 143 (F, G); South Island (Herb. Field Mus. no. 355839); *Craig* (Herb. Field Mus. no.

<sup>27</sup> Copeland, Pteridophytes of the Society Islands. Bishop Mus. Bull. 93, 57 (1932).

probably an error

596860, G); Taranaki, *Heywood* 56 (G); Mt. Ngongotaka, May–July, 1898, *Prince* (G); North Island (Ex. Herb. T. Kirk) (G). CHATHAM ISLAND: Oct., 1874, *Kershner* (US); Dec., 1874, *Scott* (US). NEW CALEDONIA: (Herb. Field Mus. no. 596487); 1861–67, *Deplanche* 1563 (G); 1874–76, *Germain* (NY). NEW HEBRIDES: Aneiteum, Feb., 1859 (Herb. Field Mus. no. 596565). FIJI ISLANDS: 1860, *Seemann* 809 (G); 1877–78, *Horne* 601 (G); (Herb. Field Mus. no. 593802). NAVIGATOR ISLANDS (SAMOA): 1873, *McAlesber* (NY). SOCIETY ISLANDS: “Ex. Forster Herb.” (NY), fragment of type.

12. *PTERIDIUM AQUILINUM* var. *YARRABENSE* Domin, Bibl. Bot. **85**<sup>1</sup>: 161 (1914). PLATE 650, FIG. 16, PLATE 653, FIG. 2, MAP 10. Illustration: Domin, Op. cit. fig. 32.

*Pteris lorigera* Wall. List no. 103 (1829), nomen nudum; isotype at US. *Pteris semihastata* Wall. List. no. 102 (1829), nomen nudum; ex Ag. Rec. Pterid. 48 (1839). *Allosorus lorigerus* (Wall.) Pr. Tent. Pterid. 154 (1836), nomen nudum.

Frond 0.5–3 m. high, vernation not observed; stipe about as long as the blade; blade 0.3–1.5 m. long, ovate to triangular, tripinnate to quadripinnate; costules of the penultimate segments subglabrous above, moderately pubescent beneath with white and rarely also dark hairs; *free lobes* usually *not present* along the rachis, costae and costules; ultimate segments usually linear, sometimes oblong-ovate, the margin glabrous or rarely pubescent, the *lower surface* usually densely *sublanuginose* or rarely arachnoid-pubescent, *not having a farinaceous appearance*, the *midnerve* usually densely *pubescent with white* and infrequently also dark hairs, *no membranous wings present* on the veins and midnerve; the *fertile and sterile indusium* rather densely *ciliate and* usually also *pubescent* on the outer surface, the *fertile portion broader than the sterile* on the same segment, *or no broader*; cells of the sterile indusium small, irregularly arranged.

TYPE: 1910, *Domin*, probably at Praha (not seen).

TYPE LOCALITY: “Nordost-Queensland bei Yarraba.”

Var. *yarrabense* differs from var. *esculentum* in having the lower surface of the blade sublanuginose rather than appressed-pubescent with straight hairs, the midnerve on the lower surface of the segments pubescent with white hairs rather than usually glabrous and the fertile and sterile indusium ciliate and pubescent rather than glabrous. Also it does not have a farinaceous appearance beneath and usually does not have free lobes along the rachis, costae and costules.



*Strange*, Australia, and *Seemann* 809, Fiji Islands, var. *esculentum*, approach var. *yarrabense* in having the fertile and sterile indusium ciliate and the midnerve of the segments slightly pubescent beneath with white hairs.

*Ching* 5360, Kwangsi Prov., China (NY, US) is intermediate between var. *yarrabense* and var. *Wightianum* and therefore represents an intermediate between ssp. *caudatum* and ssp. *typicum*.

Var. *yarrabense* grows in clearings, thickets, open slopes and at the edge of woods, up to 2500 m. from northern India to Sumatra, east to the Philippine Islands and northeastern Australia.

INDIA: Kumaon, *Blinkworth*, *Wallich*, 103 (US), isotype of *Pteris lorigera* Wall. FRENCH INDO-CHINA: Cochinchine, 1862–66, *Thorel* (Herb. Field Mus. no. 540736); Bokor, Cambodia, Jan. 18, 1926, *H. M. Smith* 288 (G, US). SIAM: Koh Chang, April 2, 1924, *H. M. Smith* 197 (US). FEDERATED MALAY STATES: Penang, Dec., 1902 (U. S. Nat. Herb. no. 1097164); Penang (ex Herb. Oldfield) (NY); Larut, Perak, April, 1884, *King's collector* 5926 (US); Tekik Sisih, Pahang, Aug. 19, 1929, *Henderson* (US); Singapore (U. S. Nat. Herb. nos. 22437, 1097181). ANAMBA ISLANDS: Jemaja, Nov. 4, 1928, *Henderson* 20306 (US). SUMATRA: Vicinity of Rantau, Parapot, Bila, March 28–May 10, 1932, *Toroës* 1832 (NY). PHILIPPINE ISLANDS: Mindanao, *Clemens* 166 (F); Bucas Island, Oct. 4, 1906, *Merrill* 5264 (US); *Cuming* (U. S. Nat. Herb. no. 853691); *Cuming*, "without a number" (G, NY). BRITISH NORTH BORNEO: Mt. Kinabalu, Kundasang, April 7, 1932, *J. & M. S. Clemens* 29107 (NY, US); Kuching, Sarawak, *Mjoberg* (NY); Sandakan and vicinity, Sept.–Dec., 1920, *Ramos* 1697 (G, US). AUSTRALIA: Daintree River, North Queensland, Feb. 29, 1932, *Brass* 2199 (G).

#### DUBIOUS AND REJECTED NAMES

*Pteris aquilina* L. var. *mexicana* Fée, Mém. Fam. Foug. **9**: 8 (1857), nomen nudum.—Fée in Mém. Fam. Foug. **8**: 114 (1857) described *Pteris aquilina* L. var. *mexicana*, which is clearly *Pteridium aquilinum* var. *caudatum*. In Mém. Fam. Foug. **9**: 8 (1857) he lists *Pteris caudata* L. var. *mexicana*, without reference, but it undoubtedly represents a transfer of his earlier var. *mexicana*. However, he also lists *Pteris aquilina* L. var. *mexicana* which, while it apparently is not the same as his var. *mexicana*, Mém. Fam. Foug. **8**: 114 (1857), cannot be defin-

itely placed without an examination of the collections cited by him: "Orizaba, W. Schaffner (1834) No 136 et (1856) No 468."

*Pteris aquilina* L. var. *lanuginosa* Fée, Mém. Fam. Foug. **9**: 8 (1857), nomen nudum.—Although probably a synonym of *Pteridium aquilinum* var. *Feei*, this name cannot certainly be placed without an examination of the collection cited by Fée: "W. Schaffner, No 137 Orizaba (1854)."

*Pteridium aquilinum longifolium*, Am. F. Journ. **1**: 88 (1910).—The publication of this name was an error: It was a new combination based on "*Pteris aquilina longifolium* Hook.", a name taken from sheet number 583 in the Herbarium of the American Fern Society. Dr. L. S. Hopkins informs me that the sheet is actually labeled *Pteris aquilina lanuginosa* Hook. and that *lanuginosa* was misread *longifolium*.

*Pteris aquilina* L. var. *decipiens* Lawson, Edinb. New Phil. Journ. n. s. **19**: 110 (1864). *Pteridium aquilinum* (L.) Kuhn var. *lanuginosum* (Bong.) Fernald f. *decipiens* (Lawson) Fernald, Rhodora **37**: 248 (1935).—Lawson's name cannot be definitely placed without an examination of the type, which is apparently lost. Lawson says he sent a specimen to D. C. Eaton, but an examination of Eaton's Herbarium at Yale University failed to reveal such a specimen. The name has been placed under var. *pubescens* and if this is correct would take precedence over it as an earlier varietal name. However, there is considerable doubt that the plant in question is var. *pubescens* and I am rejecting the name.

Although the plant was collected in the Gaspé, a likely place for var. *pubescens* to occur as a preglacial relic, and described as lanuginose, authentic material has never been collected in Gaspé Co., Quebec and the remainder of the description: "frond bipinnate, thin and membranous, . . . barren." indicates that the specimen was taken from a young plant. "Lanuginose" may apply to some part of the frond other than the lower surface between the margin and the midnerve. In a footnote Lawson himself says that: "Since the above was written, I have had an opportunity of studying the forms and development of *Pteris aquilina* [this would be var. *latiusculum*] and am quite satisfied that the doubtful plant [var. *decipiens*] is a state of that species, not old enough to be mature."

*Pteris aquilina* L. var. *glabra* Hook. Sp. Fil. 2: 196 (1858). *Pteridium aquilinum* (L.) Kuhn var. *glabrum* (Hook.) Luer. Rabenh. Kr. Fl. Ed. 2, 3: 107 (1889).—This name includes such a mixture that it cannot be definitely placed in any one variety. Hooker placed the following names under it in synonymy: *Pteris aquilina* L. (= var. *typicum*), *Pteris caudata* Schkuhr (= var. *latiusculum* and var. *pseudocaudatum*), *Pteris recurvata* Wall., *Pteris firma* Wall. and *Pteris excelsa* Bl. (= var. *Wightianum*) and *Pteris latiuscula* Desv. (= var. *latiusculum*). His range-citations include the following localities: Europe, Cape of Good Hope (= var. *typicum*), Java (= var. *Wightianum*), Massachusetts (= var. *latiusculum*), New Orleans (= var. *pseudocaudatum*) and Brazil (= var. *arachnoideum*).

#### EXPLANATION OF PLATES

PLATE 650. Fig. 1, Segment of var. *Wightianum*,  $\times 4$ , pubescence on one half not shown, on part of this half the sporangia and venation are not shown; Fig. 2, Segment of var. *typicum*,  $\times 4$ , pubescence on one half not shown, on part of this half the sporangia and venation are not shown; Fig. 3, Segment of var. *pubescens*,  $\times 4$ , pubescence on one half not shown, on part of this half the sporangia and venation and marginal pubescence are not shown; Fig. 4, Segment of var. *Feei*,  $\times 4$ , pubescence on one half not shown, on part of this half the sporangia and venation and marginal pubescence are not shown; Fig. 5, Segment of var. *decompositum*,  $\times 4$ , pubescence on one half not shown, on this half the sporangia and venation are not shown; Fig. 6, Segment of var. *africanum*,  $\times 4$ , no pubescence removed, on part of the segment the sporangia and venation are not shown; Fig. 7, Segment of var. *pseudocaudatum*,  $\times 4$ , no pubescence removed, on part of the segment the sporangia and venation are not shown; Fig. 8, Segment of var. *latiusculum*,  $\times 4$ , no pubescence removed, except on part of the segment the marginal pubescence, sporangia and venation are not shown; Fig. 9, Segment of var. *caudatum*,  $\times 4$ , on part of the segment the pubescence and sporangia are not shown and on another part the venation and farinaceous appearance are also not shown; Fig. 10, Segment of var. *arachnoideum*,  $\times 4$ , on part of the segment the sporangia and pubescence are not shown and on another part the venation and farinaceous appearance are not shown; Fig. 11, Sterile indusium of var. *esculentum*, about  $\times 75$ ; Fig. 12, Sterile indusium of var. *caudatum*, about  $\times 75$ ; Fig. 13, Farinaceous appearance of var. *arachnoideum*, about  $\times 50$ , pubescence not shown; Fig. 14, Membranous wings along vein of var. *arachnoideum*, about  $\times 40$ , pubescence and farinaceous appearance not shown; Fig. 15, Segment of var. *esculentum*,  $\times 4$ , on part of the segment the pubescence and sporangia are not shown and on another part the venation and farinaceous appearance are not shown; Fig. 16, Segment of var. *yarrabense*,  $\times 4$ , on one half the pubescence is not shown, and on part of it the sporangia and venation are not shown.

PLATE 651. Fig. 1, Middle pinna of var. *Feei*,  $\times \frac{1}{2}$ ; Fig. 2, Upper pinna of var. *decompositum*,  $\times \frac{1}{2}$ ; Fig. 3, Tip of middle pinna of var. *Wightianum*,  $\times \frac{1}{3}$ ; Fig. 4, Upper half of middle pinna of var. *typicum*,  $\times \frac{1}{2}$ .



PLATE 652. Fig. 1, Basal pinna of var. *latiusculum*,  $\times \frac{1}{8}$ ; Fig. 2, Basal pinna of var. *pseudocaudatum*,  $\times \frac{1}{2}$ ; Fig. 3, Next to basal pinnule of a basal pinna of var. *africanum*,  $\times \frac{1}{2}$ ; Fig. 4, Frond of variant of var. *latiusculum*,  $\times 1/6$ ; Fig. 5, Next to basal pinna of var. *pubescens*,  $\times \frac{1}{8}$ .

PLATE 653. Fig. 1, Upper half of middle pinna of var. *esculentum*,  $\times \frac{1}{2}$ ; Fig. 2, Basal pinna of small plant of var. *yarrabense*,  $\times \frac{1}{2}$ ; Fig. 3, Upper pinna of var. *arachnoideum*,  $\times \frac{1}{8}$ ; Fig. 4, Tip of frond of var. *caudatum*,  $\times \frac{1}{2}$ .

## AN OLD FOREST IN STONINGTON, CONNECTICUT

HUGH M. RAUP

ON November 18, 1939, the writer had occasion to visit, in company with a group of students in Ecology, a piece of old woodland at the mouth of the Pawcatuck River in southeastern Connecticut. The area is of particular interest because it has been considered by some to have been not far removed from a primeval condition. Like so many of our supposed or actual remnants of the virgin forests in southern New England, it suffered great damage during the hurricane of 1938, and there now remains only a battered representation of the once handsome stand of trees.

The late Dr. G. E. Nichols, in describing the virgin forests in Connecticut wrote an account of the tract.<sup>1</sup> Since this account gives an excellent picture of the forest, and since such descriptions now take on rather more historic interest than they had before the hurricane, it seems worth while to quote Dr. Nichols in full.<sup>2</sup>

"Southeastern Connecticut, so far as ascertained, possesses only one possible fragment of original forest and, notwithstanding the owner's assurance that the area has never been cut over, the writer must confess to some doubt as to the primeval nature of the tract. The area in question, some 40 acres in extent, occupies a low hill bordering the Sound at the mouth of the Pawcatuck River in the town of Stonington. In contrast to the forests heretofore described there is a complete absence of hemlock, beech, sugar maple, yellow birch, pine, and even chestnut. The character trees are white oak and black oak (*Quercus velutina*), especially the former, associated with which are shagbark hickory and red maple. The stand is of a more open character than in any of the areas previously mentioned and in general aspect the forest resembles the climax oak-hickory type of the Chicago region.

<sup>1</sup> Nichols, G. E. "The Vegetation of Connecticut" II, *Torreyia* 13: 214-215 (1913).

<sup>2</sup> No photograph of the Stonington tract was published by Dr. Nichols. The writer is indebted to Dr. H. J. Lutz of the School of Forestry at Yale for making a thorough, though unavailing, search in Dr. Nichols' files for any photograph that the latter may have had.

Trees with a diameter of from 45 to 60 centimeters are common. The ground is not deeply shaded and the low, dense underbrush is quite xerophytic, being composed largely of *Gaylussacia bacata*, *Vaccinium corymbosum*, *Vaccinium stamineum*, and *Corylus americana*. It is of course not impossible that the xero-mesophytic nature of the tract is due to its extremely exposed location and that it really represents a virgin forest. Moreover it must be borne in mind that in general the forests of eastern Connecticut are less mesophytic than are those in other parts of the state."

At the time of the writer's first visit, the loggers were actively engaged in clearing out the tangle of fallen stems and branches which resulted from the hurricane. Nearly all of the tract was destroyed, leaving only a few scattered trees on the north, or landward side. A considerable number of logs of fair quality were being taken out, leaving newly cut stumps upon which ring counts could be made. In the short time available only eleven stumps were counted, ranging in number of rings from 110 to 136. Two facts were apparent: first, the trees all showed relatively wide rings in their early period of growth; and second, their average age was approximately 123 years which was the length of time between the hurricane of 1815 and that of 1938.<sup>1</sup> Since they were among the largest and oldest trees in the stand there seemed some evidence that Dr. Nichols' chariness about considering the forest to be entirely unmodified might be well founded. The spread in ages among the trees remained to be explained, however, and it was especially desirable to find some more conclusive evidence of an actual release which could be attributed to a cataclysm similar to that of 1938.

With these problems in mind, the tract was visited again in May, 1940. The logging operations were then nearly completed, and many more stumps were available. Fifty-one were counted on this occasion, all of them solid, or nearly so, to the core, and cut from one to three feet above the base. Most of them may be divided roughly into two age groups. The smaller of these consists of five trees, all of which contained over 140 clearly visible rings. All of these showed a distinct release, indicated by a more or less sudden widening of the rings, immediately after 1815. The larger group, as indicated by the earlier observations, con-

<sup>1</sup> Channing, Walter (Editor). *New England Hurricanes, 1635, 1815, 1938*. Boston, 1939. Brooks, Charles F. *Hurricanes into New England: Meteorology of the Storm of September 21, 1938*. *Geog. Rev.* 29: 119-127 (1939).

sisted of 41 trees in which, judging by field observations, no obvious release was evident near the center. In the case of those with ages under 123 years none could be expected if the 1815 hurricane were significant; but some 21 individuals showed ages ranging between 124 and 140, and might be expected to have experienced a release after 1815.

There is no way of knowing how many years must be added to the count for each tree to round out its full life, unless each could be dissected to the very base. If, however, a release in 1815 is accepted, then it is to be expected that seedlings and small trees existing at that date had previously been suppressed in greater or less degree depending upon their ages and local positions in the ancient forest. Counts were made on two small trees in the advance growth under the forest which was blown down in 1938. Both of these were young white oaks, growing in the shrubby cover of *Gaylussacia*, *Vaccinium*, and *Corylus*. One of them, 2 feet high, had a stem only about six inches long and about one half an inch in diameter. The other was four feet tall, with a stem about two feet long, and a diameter of about five-eighths of an inch at the base. The first proved to be twenty-nine years old, and the second sixteen years. In both the rings were so close together and confused that microscopic sections had to be made before good counts were possible<sup>1</sup>; and both showed a sudden release after 1938. That is, there was one unusually wide ring at the outside which constituted the growth of 1939.

Two suggestions are to be derived from these observations. One is that about half of the trees blown down in 1938 began as seedlings or sprouts immediately after 1815, or were present as suppressed advance growth in a forest which existed prior to 1815, and were released at that time. Second, the absence of a release in the 21 trees showing 123 to 140 rings may be due to a certain amount of clearing prior to 1815. At the margins of the tract there are some areas that have been pastured considerably, with grassy glades and a partial cover of blackberry bushes. Old white-oaks growing in these spots showed no release in 1815, indicating that similar conditions may have existed at that time, possibly more widespread than subsequently.

The five older trees, which showed a definite release, had at-

<sup>1</sup> The writer is indebted to Mr. F. C. Barghoorn for cutting these sections.



tained such size in 1815 as to have reached up into better light and to have begun to put on more wood with more clearly defined rings each year. The oldest of the five showed about 180 rings on the stump to which must be added a considerable number for the years required to reach stump height. The rings nearest the center were, as would be expected, very small, but there followed a period of gradual increase to 1815 when the tree was about six inches in diameter. After the sudden release of 1815 it began to put on wood much faster. All of these five old trees had minute rings near the center, clearly indicating suppression. There seemed to be no close relationship between the diameter of the trees and their age. Some that were 12 to 15 inches in diameter were fully as old as those two feet or more in diameter.

Another observation which bears out the theory that the 1815 hurricane was responsible for a great amount of damage is that the older trees counted, that is, those which had attained some size by 1815 and were reaching toward the canopy, were all on the landward side of the tract where they would not be subject to quite so much wind as those nearer the shore line. It has already been noted that the remnants of the last hurricane are for the most part on the landward side.

This study indicates that the old oak-hickory wood at Stonington was far from unmodified prior to the hurricane of 1938; that it was seriously damaged in 1815, presumably by the hurricane of that year; and that its canopy had been partially opened before 1815. There is also the suggestion that in spite of the early clearing, and in spite of devastating destruction in 1815, it did not change much in its hardwood composition. The existence of advanced growth of white oak, black oak, hickory, and red maple, suppressed because of a dense canopy prior to 1815, suggests that the trees in that canopy were not far different from those which were destroyed recently. An alternative hypothesis would be that prior to 1815 there had been some very old second growth or primeval forest of other facies which might have created a habitat similar to that which now appears in our old field white pine or red cedar stands. Such a primeval forest is not consistent, however, with the early accounts of the coastal vegetation in this

region, which describe forests of oaks, hickories, and chestnuts.<sup>1</sup> Furthermore, it does not seem at all likely that in a growing colony along the coast, farm-land could have been cleared, used, and abandoned so long prior to 1815 as to give rise to old-field stands which could have created such a habitat.

Between 1815 and 1938 there is no evidence of release cutting. There are no sudden breaks in the development of wood except for occasional periods of very slow growth, probably due to dry or cold seasons. One such period occurred about 1890, and lasted for three or four years.

ARNOLD ARBORETUM  
Harvard University.

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REMARKS ON THE NAME *PHLOX NIVALIS*.—In RHODORA xlii. 476 a question is raised as to the validity of the name *Phlox nivalis* as applied to the subulate-leaved species of the southeastern Coastal Plain and Piedmont. While this name, when proposed by Loddiges, was not accompanied by an adequate description, it was validated by Sweet in Brit. Flow. Gard. ii. no. 185 only four years later. The latter author published a more faithful representation of the habit of the plant than had been given by Loddiges' crude plate, and also an accurate drawing of the floral parts. His text included a detailed english description and a latin diagnosis, so that all requirements are fulfilled.

Nuttall's name *P. Hentzii* was not published until seven years later, and his diagnosis was not so full as that of Sweet. A sheet in the herbarium of the Academy of Natural Sciences of Philadelphia bears an annotation by Nuttall which shows that he was familiar with the earlier name, but he failed to mention this when he proposed his new one. Under our present rules of nomenclature Nuttall's name is to be rejected as superfluous when published, and the plant should be known as *Phlox nivalis* Lodd. ex Sweet.—EDGAR T. WHERRY, University of Pennsylvania.

<sup>1</sup> For reviews of early descriptions of southern New England Forests see Bromley, Stanley W. *The original Forest Types of Southern New England*, Ecol. Monog. 5: 61-89; and Raup, H. M. *Recent Changes of Climate and Vegetation in Southern New England and Adjacent New York*, Jour. Arn. Arb. 18: 79-117.

REAPPEARANCE OF RARE NEW ENGLAND  
MARINE ALGAE

WM. RANDOLPH TAYLOR

SPORADIC occurrences of marine algae are often more puzzling to botanists than would have been the case had the plants belonged to the land flora. It is notably more difficult to picture comprehensively the distribution of marine species, to locate small isolated colonies and, from lack of detailed knowledge of the sea bottom to differentiate physiographic from climatic limitations of range, particularly if the plants are rare, or at least rarely reported. The writer, having rather intensively observed a considerable area about Woods Hole, Massachusetts for over twenty years, has seen a number of reappearances of forms but once, or seldom, reported previously. It seems improbable that the plants have been abundantly present during the intervening years but remained undetected; they may have persisted as scattered individuals vegetatively propagated, or they may have been reintroduced from outside the area.

The current season has provided two notable examples. On landing at Gay Head, Marthas Vineyard, on July 10th, 1940, the writer almost immediately noticed on the sand an alga not previously found by him, but recognized as *Platoma Bairdii* (Farlow) Kuckuck. With the help of his class, there collecting algae for study, he secured several specimens and returned a week later for more. Altogether, many score specimens were brought back and preserved. Farlow (1875, p. 372) described<sup>1</sup> the plant as *Nemastoma ? Bairdii* on one small tetrasporic piece, and it has not been found in America in the interval; the next significant report<sup>2</sup> is that of Kuckuck (1912, p. 189) who made the present combination after finding more ample material off Helgoland and studying the asexual and sexual material thoroughly. The writer has not noticed sexual plants in the new Gay Head material, but it is richly tetrasporiferous. Here, then, is a species but once seen, reported again in great abundance after nearly 70 years of probable absence from the type locality

<sup>1</sup> Farlow, W. G. 1875. List of the Marine Algae of the United States with notes of New or Imperfectly Known Species. Proc. American Acad. Arts and Sci., **10**(11): 351-380.

<sup>2</sup> Kuckuck, P. 1912. Über *Platoma Bairdii* (Farlow) Kuckuck. Wiss. Meeresuntersuch., N. F., Abt. Helgoland, **5**(3): 189-210.



in an area inspected annually (for more than two decades) by dredging and shore collecting.

On the same day the *Platoma* came to light, one of the party brought to the writer in the field a small brown specimen which was easily distinguished as *Tilopteris Mertensii* (J. E. Sm.) Kütz., which he<sup>3</sup> had found in dredging off the same shore in 1931 (Taylor in Lewis and Taylor 1933, p. 151). On the first occasion two or three small pieces were found; on this there were several good specimens, all sporangial as before. There were none to be had at the same place a week later. Both *Platoma* and *Tilopteris* were washed ashore, but their normal habitat is on rocks in relatively shallow water. No plants were secured in 1940 when dredging nearby. With them was another species, rare in the region, which appeared in some abundance, namely *Gloiosiphonia capillaris* (Huds.) Carm. This the writer has only found on one or two earlier occasions.

A few words regarding other plants recognized as recently new to the district, or rare, may be pertinent. The Phaeophyceae *Acrothrix novae-angliae* Taylor, first seen in 1925 and described<sup>4</sup> in 1928 (Taylor 1928, p. 577) has persisted and become more common, particularly during the current season. In 1934 the writer found<sup>5</sup> the tropical *Sargassum fluitans* Børg. washed ashore on Nonamesset Island (Taylor 1937, p. 211). The better known *S. natans* (L.) J. Meyen has frequently been reported, probably blown out of its usual path in the current of the Gulf Stream. We may add to these as a rare visitor to the coast *S. Hystrix* var. *buxifolium* (Ch.) J. Ag., which the writer found on the south side of Nantucket Island on the 17th of July 1938, associated with both of the above mentioned species. Among Rhodophyceae *Trailiella intricata* (J. Ag.) Batt. (Drew and Hof in Lewis and Taylor 1928, p. 196) has not continued as abundant as it was about 1930, but from 1927 to the present has turned up each summer, sometimes rare but generally in moderate amount. *Asparagopsis hamifera* (Har.) Okam. has continued in the flora,

<sup>3</sup> Lewis, I. F. and Taylor, W. R. 1933. Notes from the Woods Hole Laboratory, 1932. RHODORA 35: 147-154.

<sup>4</sup> Taylor, W. R. 1928. A Species of *Acrothrix* on the Massachusetts Coast. Amer. Jour. Bot., 15: 577-583.

<sup>5</sup> Taylor, W. R. 1937. Marine Algae of the Northeastern Coast of North America. vii + 427 pp., 60 pl. Ann Arbor.

with less fluctuation (Taylor in Lewis and Taylor 1928, p. 197).<sup>6</sup> *Plumaria sericea* (Harv.) Rupr. (Taylor 1937, p. 330)<sup>5</sup> and *Phycodrys rubens* (Huds.) Batt. (Taylor 1937, p. 351)<sup>5</sup> have occasional seasons of relative frequency, but are generally very scarce. *Lomentaria orcadensis* (Harv.) Coll. (Taylor 1937, p. 309) was rarely reported, but for two or three years about 1931 it was very frequent in shallow water at several stations; it now has not been seen for some years. *Scinaia furcellata* (Turn.) Biv., considered not rare by Davis about 1911 at suitable places, is only found at rare intervals in small pieces. Among Myxophyceae *Brachytrichia Quoyii* (C. Ag.) Born. & Flah. also is sporadic, having been seen here three times in over twenty years, tending to return in the old localities.

UNIVERSITY OF MICHIGAN.

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NYMPHAEA TETRAGONA IN SOMERSET COUNTY, MAINE.—While on Waterfowl Survey work for the Maine Department of Inland Fisheries and Game, the writer with Virgil S. Pratt found *Nymphaea tetragona* Georgi in three localities in Somerset County. Previous reports of this plant for the State are by Wayne E. Manning, who found it in Chase Brook at Portage Lake<sup>1</sup>, and by Olof O. Nylander, who reported it at Salmon Brook Lake Bog in Perham<sup>2</sup> and in Mosquito Brook at Portage Lake.<sup>3</sup> These stations are all in Aroostook County.

In Attean Pond in the town of Attean near the mouth of Moose River the plant was found scattered over several acres of open water, associated with *Potamogeton natans* L. and *Polygonum natans* A. Eaton. The water was about four feet deep over a bottom of firm mud; it had a pH of 7.0. Specimens of this collection will be deposited in the herbarium of the University of Maine and in the herbarium of the New England Botanical Club. In addition scattered plants were found in Dennistown. These were in Branch Stream, which flows into Little Big Wood

<sup>6</sup> Lewis, I. F. and Taylor, W. R. 1928. Notes from the Woods Hole Laboratory, 1928. RHODORA, 30: 193-198.

<sup>1</sup> Manning, RHODORA 38: 375, 1936.

<sup>2</sup> Nylander, Contribution to Free Booters Club of Knowledge, Caribou, Maine, January, 1938.

<sup>3</sup> Nylander, Presque Isle Star-Herald, November 21, 1940.

Pond. A few plants were also seen in Holeb Pond in the town of Holeb.

Dr. E. C. Ogden of the University of Maine verified the writer's identification.—J. S. GASHWILER, Department of Inland Fisheries and Game, Augusta, Maine.

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DEAM'S FLORA OF INDIANA.<sup>1</sup>—Dr. Deam's Flora of Indiana has been long awaited. Its preparation has involved forty years of collecting and observation throughout the state, the accumulation of one of the largest and best private herbaria ever got together in this country and of a library of like scope and excellence, and unremitting vigilance in checking detail and in keeping abreast of current taxonomic developments. Those who knew this and were familiar with the author's previous publications had formed high expectations of the Flora. They will not be disappointed.

It has about everything yet thought of which a good local flora should have—an introduction giving physiographic information; an abundantly annotated list, arranged according to the Engler & Prantl system, of the 2530 species and varieties admitted and the 707 rejected records; a glossary, statistical summary, bibliography, etc. Its taxonomy in a few critical groups has been contributed by specialists and in others rests on their determinations, but is enriched by an occasional original study or critical comment out of the author's own experience; and its keys are largely original and made up from Indiana material. Less usual, but equally commendable, features are: a list of obsolete place-names, and one of collectors who have worked in Indiana, giving dates of birth and death when available, areas in which the collections of each were chiefly made, herbaria in which specimens are preserved, and the number of each collector's specimens seen, even when that number is only one.

The general plan of the work is familiar enough; its distinction lies, not in any innovation, but in the high quality of its execution. There is constant and successful striving after clarity; all terms and methods used are explained with extreme care. There is, as Prof. Coulter points out in his foreword, an unusual wealth of ecological data for all species, as to soils, types of forest, associated species, and the like. And this and a great mass of other detail are set forth clearly and systematically.

If, with all this care, functioning in one minor matter, the orthography of English names, is not perfect; if Dr. Deam has failed to achieve consistency therein<sup>2</sup> and has occasionally admitted such orthographic and grammatical monstrosities as "Smallflower Sweetbrier," he is no worse off than many others of us. Perhaps no one but the present reviewer will notice these minutiae anyway. Nevertheless, it would have been

<sup>1</sup> Deam, Charles C. Flora of Indiana. Indiana Department of Conservation, Indianapolis. June, 1940. 1236 pp., 1 pl. 2247 maps. \$3.50, at the State Library, Indianapolis.

<sup>2</sup> For instance: Curly Wildginger (p. 403), Blue Wild-indigo (591), Trailing Wild Bean (622); Crested Woodfern (48), Violet Wood Sorrel (627); Green Adder's Mouth (349), Green Adder's-mouth (1167); Few-flowered Spikerush (204), Large-flower Sensitive Plant (587).



gratifying if, as one detail of a major enterprise, he could have worked out a better balanced system, more consonant with the best existing usage.

In publishing the Flora, the Department of Conservation of Indiana has happily not limited Dr. Deam as to space and has turned out a neatly bound volume, with handsome typography. Some rather egregious printer's errors, such as repeating the line containing the name *Dryopteris Goldiana* in the place where *D. cristata* ought to be, have, however, slipped by and seem particularly glaring in a work so meticulously careful in nearly every detail under the author's control.

There can be no question of the lasting importance of this Flora in its field. Few have been so well done. It will long serve students of floristics and distribution as an abundant source of reliable information; and (like Brendel's Flora Peoriana, which Dr. Deam once told me he had taken as his own model) it sets a standard of excellence for authors of future local floras to live up to—if they can.—C. A. WEATHERBY.

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A NEW FORM OF *BROMUS INERMIS*.—Hungarian or smooth brome-grass is distributed throughout Minnesota as a cultivated crop and as an intruder along roadsides.

In the fall of 1938 a specimen of *Bromus inermis* Leyss. which exhibited a peculiar bulbiferous state was submitted to me by Mr. Clemens Kaufman. This appears to be a new form and is being proposed as such at this time.

*BROMUS INERMIS* Leyss. forma **bulbiferus**, forma nova. A forma normali differt inflorescentiis bulbillos gerentibus.

In this form some of the florets are replaced by bulbils. This state is similar to that well known condition in *Poa alpina* L.<sup>1</sup>

The TYPE was collected on Cleveland Avenue four miles north of the campus of Minnesota College of Agriculture, Ramsey County, Minnesota, October 11, 1938. The type is deposited in the University of Minnesota Herbarium.—JOHN W. MOORE, University of Minnesota.

<sup>1</sup> *Poa alpina* L. forma *vivipara* (Willd.) Scribner & Merrill. Contrib. U. S. Nat. Herb. 13: 68, June 8, 1910.

Volume 43, no. 505, including pages 1-36 and plates 650-652, was issued 15 January, 1941.

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